FEBRUARY 5, 1951

STEEL

The Weekly Magazine of Metalworking

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DO Slips Gears; Push CMP Shift, p. 47

For Precision Finishes—Abrasive Tumbling, p. 81

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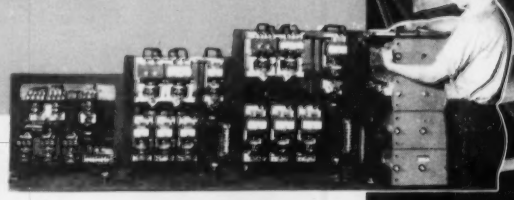
Avoid Crane Shutdowns!



New

WHITING MAGNETIC CONTROL requires no contact maintenance

HERE is a crane you can operate 24 hours a day without stopping to file or dress the control contacts. The new Whiting Magnetic Control has solenoid contactors with silver-alloy contacts that never need filing or sanding. Eliminates expensive, time-consuming contact maintenance.

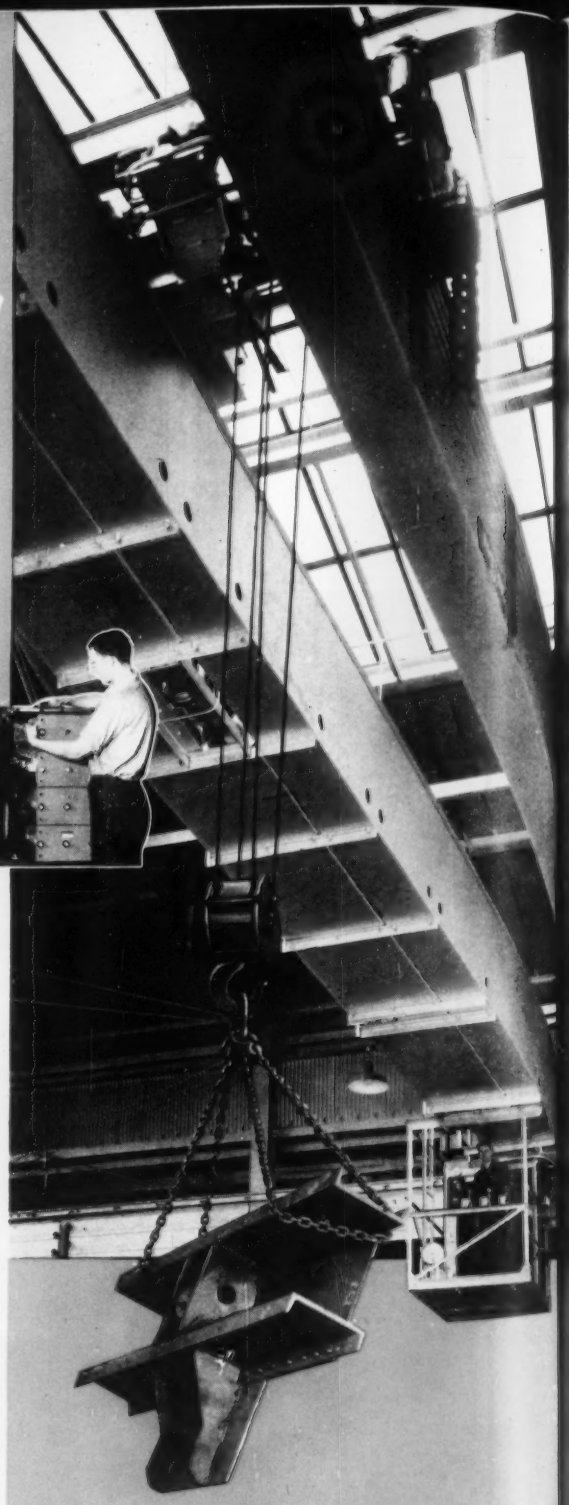
The new Whiting Magnetic Control replaces bulky drum-type controllers with master switches that occupy very little space and give the operator full vision in all directions. In addition, heavy over-engineered clapper contactors are replaced by modern, compact solenoid contactors—rated to fit the motor. Heavy slate panels and sheet metal enclosures are eliminated. Yet the new Whiting Control is only slightly more costly than drum-type control, and much less expensive than conventional magnetic control.

Your new Whiting Crane can be equipped with the new simplified magnetic control system, or with conventional manual or magnetic systems. Furthermore, Whiting will convert manual-type cranes to this new magnetic system.

Write for New Magnetic Control Bulletin, Unit 72.

WHITING CORPORATION
15643 Lathrop Avenue Harvey, Illinois

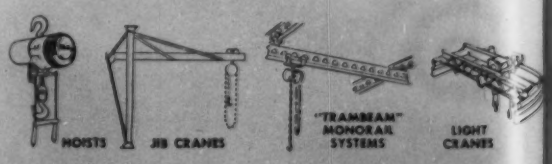
Offices in Chicago, Cincinnati, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Representatives in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church Street, New York 7, N. Y.



WHITING

OVERHEAD TRAVELING CRANES

Also: Foundry Equipment • Railroad Equipment • Metal-Working Machinery • Swenson Evaporators and Spray Dryers



STEEL
The Weekly Magazine of Metalworking
VOL 128 NO. 6 FEBRUARY 5, 1951

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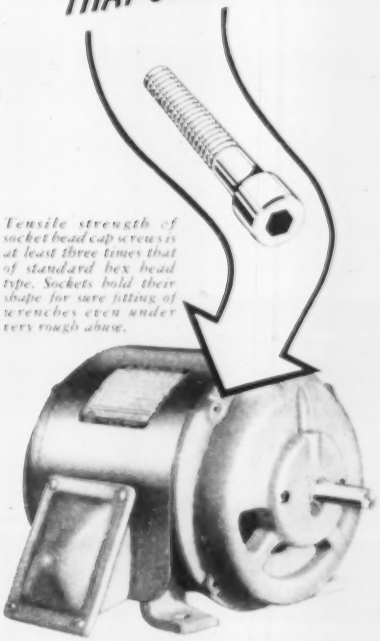
Editorial and Business Staff—Page 10. Advertising Index—Page 188. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Next Week . . . **Aircraft Production: Opportunity for Subcontractors . . . Mass Marquenching Speeds Gear Output . . . Straight-Flow Materials Handling Simplifies Integrated Operation . . . Electroforming—A Mass Production Tool**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35 cents. Metalworking Yearbook issue $2.00. Entered as second class matter at the postoffice in Cleveland, under the Act of March 3, 1879. Copyright 1951 by Penton Publishing Co.

In making a better motor...
IT'S THE LITTLE THINGS THAT COUNT, too!



Tensile strength of socket head cap screws is at least three times that of standard hex head type. Sockets hold their shape for sure fitting of wrenches even under very rough abuse.

All RELIANCE MOTORS are *Precision-Built* down to the last detail!

PRECISION-BUILT at Reliance applies just as fully to the smallest details of a motor as to the major parts. An excellent example of this is the use of heat-treated *socket head* cap screws, in place of the conventional hex head, for assembling brackets, bearing cartridges, and other parts.

It will pay you to have the facts on all of the *extra* steps taken to give you dependable power longer in Reliance PRECISION-BUILT Motors. Write today for Bulletin B-2101, or call in a Reliance representative.

RELIANCE Precision-Built MOTORS

Sales Representatives in Principal Cities

RELIANCE
ELECTRIC AND ENGINEERING CO.
1081 Ivanhoe Road • Cleveland 10, Ohio

"Motor-Drive is More Than Power"

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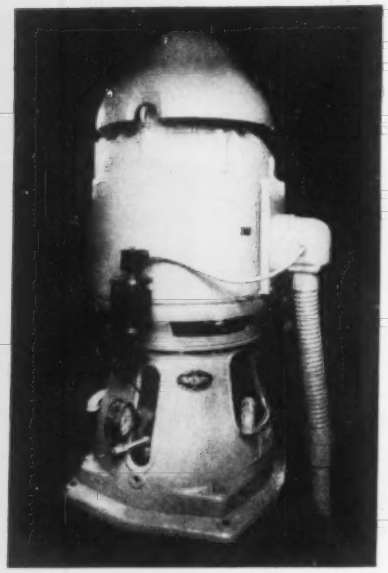

Every Inch

BUILT FOR DURABILITY

All Layne Well Water Systems are designed and built to give many years of durability,—and that durability extends into every part from motor base to well screen. Once installed according to Layne's own exclusive methods, these ground water supply systems have a record for giving extraordinary satisfaction over extremely long periods of time. This means that as an investment, Layne Well Water Systems always more than justify their cost.

Layne knows that without durability, all of their fine designing and high efficiency features would be lost. As the world's most widely experienced builder of ground water supply equipment, Layne knows what it takes to create durability.

Layne designs and builds complete well water systems, drills the wells and installs pumps to produce ground water for any purpose,—cities, factories, processing plants, etc. No charge is made for their study and recommendations.

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General Offices Memphis 8, Tenn.

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Behind the Scenes . .

Trio in Couplets

We have come across this trio of letters regarding duplicate copies of some promotional mail we sent to Bob Clarke, Torrington Co., Torrington, Conn. The first letter is from Bob to Cal Fisher, STEEL's advertising representative in New England.

> I welcome all your literature, it's loaded with appeal. And every man like me, I'm sure, depends a lot on STEEL. But why send me so many when one copy would suffice? Why not save a penny? I can't read the damn things twice.

The second letter is from Cal to Bob:

> We thank you for your letter, and know you have a point in asking that we keep our mail from lousing up your joint. Sure glad that you appreciate the wisdom that we send. But repetition is no way to treat a darn good friend.
>
> It's obvious to you and me our system's run amuck. And the cause of all the trouble is the "Clarke" key's getting stuck. The quickest way to fix you up, I think you will agree, is use the oil our salesmen spout and pour it on your key.

The whole matter was referred to Clyde Bailey, STEEL's advertising service manager, who had the "Clarke" key corrected and then replied thusly:

> Your letter of the seventeenth has come to our attention. It's really good to learn about the various things you mention.
>
> You sure make sense with your comments about our double mailing. We agree with you it's wasteful, too, and waste is not our failing.
>
> Spurred by your rhyme, we took the time to check our operation. We scanned our lists and shook our fists to find a duplication.
>
> This has been changed, you may be sure, there is no need to doubt it. Many thanks to you for your trouble, too, in telling us about it.

Big Meeting

Earl Shaner, Irwin Such, Walt Campbell and Ed Kreutzberg represented STEEL at a gala meeting of the Society of Business Magazine Editors in Washington a while back. Irwin is vice president of the society.

President Truman spoke upon the role business papers can play in mobilizing American industry for the crisis. He also presented the Silver Quill Award of the National Business Publications to Paul Wooton, Washington representative of Chilton publications. He told how he and Mr. Wooton had been neighbors in the 1930s when the Trumans had first come to Washington and how Mr. Wooton had been kind to Margaret, then a small girl.

"And when anybody is kind to Margaret," the President said, "I never forget it. And neither do I forget it when they are not."

Price Almanac

In this year of controls and limitations, STEEL's market men have been deluged with requests for information.

Among them has been a query from the Bureau of Labor Statistics. The bureau seeks price information from us in a survey to revise its wholesale price index. So much in demand has been STEEL's pricing service that the Cleveland Public Library puts the magazine under lock and key and gives it out only to those who sign for it.

Copies of one price and production chart are still available that may help you. Originally prepared for the meeting of the Institute of Scrap Iron & Steel, the chart shows the 49-year trend of heavy melting scrap prices and steel output from 1902 to 1950. To get a copy, write Market Editor W. M. Rooney, Penton Bldg., Cleveland 13, O. First come, first served.

Puzzle Corner

The bookworm travels ¼ inch in the problem of Jan. 22. As many of you pointed out, that puzzle was an old chestnut, but still tricky. We received more incorrect answers to it than to any one we've submitted in the past year. Submitting correct answers were James F. Macaulay of Wheeling Steel Corp., David M. Romsey Jr. of Republic Steel Corp., T. W. White and David A. Lieberman of Ther Electric & Machine Works, H. C. Osborne of Webster Electric Co. and T. S. Bean of Barber & Ross Co.

Robert W. Huff of Canton, O., submits this problem: Two ships are traveling toward each other at the rates of 20 and 30 knots respectively. When they are 200 nautical miles apart, a launch starts from the fastest ship and speeds toward the other which it meets in one hour. The launch travels back and forth between the two ships until they meet, at a speed which decreases at the uniform rate of 10 knots per hour. Assuming no time is lost in turning around, how far has the launch traveled by the time the ships meet?

Shradu

(Metalworking Outlook—page 39)

"Just what the doctor ordered!"

"We have a new Service Division. It's a separate group in our Sales Department set up to handle service work, such as hearth installations, refractory practice surveys, tests, etc. And the boys in the back room say it's a long step in the right direction.

"This Service Division's a chip off the old block. Just like their comrades in arms in the Sales Department, the Service men are ex-steelmakers. Years ago we found out that steelmakers make good refractory sales and service men. So we've always staffed our Sales Department with men with practical steelmaking experience. They hit the bullseye. And that's why we stick to our guns in hiring new hands for the Service Division.

"Our need for a special Service Division really started back in 1940. Venturing where angels fear to tread, we told the steel industry that our magnesia ramming mix, Ramset, might eliminate a lot of blood, sweat and tears on new hearth installations—in major hot and cold repair work, too.

"Well, the industry said, we're from Missouri. The proof of the puddin' is in the eating. And you gotta show us. So the die was cast and we undertook to supervise Ramset jobs with our limited Sales staff.

WERE WE SWAMPED!

"We were bears for punishment in those days. Pretty soon we found ourselves on the horns of a dilemma. The Sales Department was so busy on service work that they didn't have time to sell. We were robbing Peter to pay Paul. On the one hand we couldn't handle all the service work that needed doing. At the same time our men couldn't be out winning friends and influencing people. In fact, we were between the devil and the deep blue sea. It looked like Basic might soon be a case of out of sight, out of mind, with those customers who weren't getting as much service with a smile as they wanted.

"Naturally we didn't want absence to make the heart grow fonder for somebody else's products. So we took the bull by the horns. Nothing ventured, nothing gained, you know. With the new Division we have arranged to furnish service around the clock. And we aren't sending a boy to do a man's work. We want you to see that it pays to leave the plumbing to the plumbers.

"We saw the light on another point, too. We had the right products and the right men. But something was still missing. Clothes alone don't make the man. Right equipment was necessary to save the day.

MOTHER NECESSITY INVENTS

"Always before, we cut the pattern to fit the cloth—mixing Ramset by hand or in a concrete mixer, moving the tempered Ramset by wheelbarrow to the furnace and compacting the Ramset with backfill tampers. But recognizing that a job worth doing is a job worth doing well, that time is money and that handsome is as handsome does, we decided to get the right tools for the job.

"Seizing time by the forelock, we added an 18-cubic foot mortar-type mixer to our kit. It tempers Ramset rapidly without segregation or balling and permits maintenance of a uniform moisture content.

"A straight line is the shortest distance between two points, so we designed and had built a belt conveyor to match the capacity of the mixer. That eliminates wheelbarrow labor and delivers tempered Ramset from the mixer, OVER charging buggies, into the furnace.

"Realizing also that you can't drive a spike with a tack hammer, we fell to the task of finding a faster, better way of tamping Ramset into place. Even a blind hog turns up an acorn now and then and our rooting uncovered a mechanical tamper that gives Ramset what Paddy gave the drum. The new device has a blow that would fell an ox. It cuts down the manpower previously required, and saves plenty of silver seconds and golden minutes. That's our complete ball of wax—to date.

FIRST COME, FIRST SERVED

"And here's the deal: Since any worker is worthy of his hire, we've hung a 'For rent' sign on this equipment package. It's open for engagements on a bargain basis, calculated to cover amortization, maintenance and delivery to your door by our Service Division truck. Virtue being its own reward, we don't charge anything for the 24-hour supervision of your hearth and major repair jobs by the Service Division.

"To date only one complete package is ready. So renting the equipment is on a first come, first served basis. But it's only the beginning. We expect to have several other expanded equipment packages available soon. When that good day comes there need not be a case of he who hesitates is lost or of haste makes waste.

"Maybe you can't teach an old dog new tricks, but if practice makes perfect, you can be sure the jobs our Service Division undertakes will prove that experience is the best teacher.

"And we're not selling a pig in a poke because blazing a trail isn't a new experience for us. You remember it was our people years ago who paved the way on hearth installation techniques (including the use of forms) now used from the rock-bound coasts of Maine to the sunny shores of California.

"Just remember your success is our happiness. We hope you'll give us a chance to get to the bottom of your trouble.

"Yours for better bottoms,"

OLD BILL BASIC

Basic Refractories Incorporated **845 HANNA BUILDING, CLEVELAND 15, OHIO**

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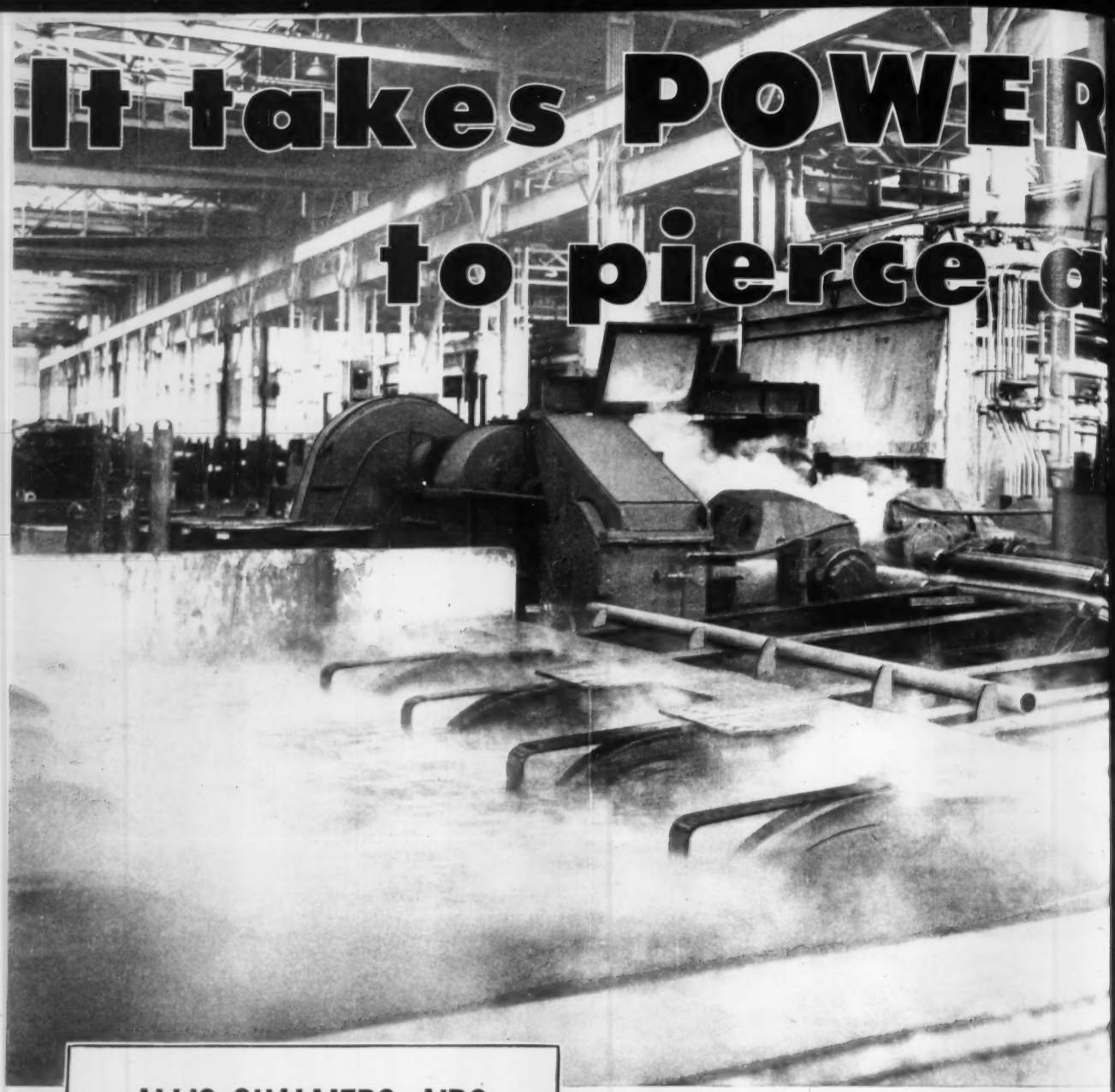


ALLIS-CHALMERS AIDS CONVERSION PROGRAM AT AMERICAN BRASS COMPANY

WHETHER FERROUS OR NON-FERROUS, the metal producer will get *skilled* attention from Allis-Chalmers on electrical needs. The Kenosha, Wis. copper tube mill of The American Brass Co. shows how Allis-Chalmers equipment assists the non-ferrous metal producer.

This mill was built during the last war to roll brass for small arms ammunition. Allis-Chalmers equipment driving and controlling the hot rolling mills proved so satisfactory that more Allis-Chalmers equipment was specified in the post-war conversion to non-ferrous tube manufacture.

ALLIS-CHALMERS EQUIPMENT INSTALLED

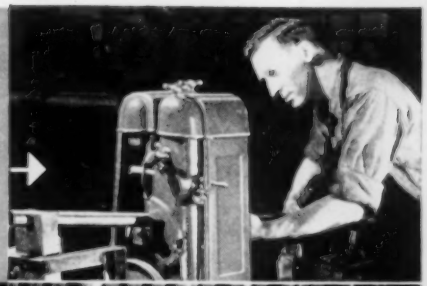
In this conversion, Allis-Chalmers supplied the rotating equipment, switchgear and control for the piercing mill, hydraulic squeeze pointer, and three 100,000 lb triple draw-benches. The supporting Allis-Chalmers motor-generator sets and switchgear are in an enclosed Motor room (lower right), for which Allis-Chalmers supplied the ventilating equipment.

Power, Electrical, Processing Equipment for Metal Industry

ALLIS

Standard Delta Bench Lathe used by Allen Bradley Co., Milwaukee, to wind electrical coils at low cost. Coils wound between two plates on mandrel held in 3-jaw chuck, supported by tail center.

Two standard Delta Abrasive-Belt Finishing Machines mounted on one stand provide low-cost tube polishing set-up. Two motors are used — one speed for drive and feed action, one for actual grinding.



Battery of standard Delta 10" tilting-arbor Unisaws used by Consolidated Vultee Air-Craft Corp., San Diego, California to cut aluminum alloy in a wide variety of thin sheets and shapes.

DELTA
MILWAUKEE
®

"Designed for wood but "Doubling in Brass"

For many of your non-ferrous metal operations Delta woodworking machines offer quick, low-cost solutions

Don't let habit limit your planning when machines are scarce, time is short, and costs run high! Remember that *standard Delta woodworking machines are often the quickest, best, low-cost solution* for non-ferrous metal cutting, machining, and fabricating. Our files are full of other convincing reports like those shown above. Send for complete details — and plan your jobs around the versatility of dependable Delta tools — high in quality, low in cost! Call on Delta's engineering service help.

Sold only through authorized dealers — available on easy time payments. Look for the name of your Delta dealer under "Tools" in the classified section of your telephone directory.

DELTA POWER TOOL DIVISION

Rockwell
Manufacturing Company
MILWAUKEE 1, WISCONSIN

DELTA • MULTIPLEX • CRESCENT • HOMECRAFT

From the world's most complete line
First in selection!
First in quality!
First in value!

Delta 10" Tilting Arbor Unisaw

Big table, big cuts — rips stock (wood) 3⅛" thick, cuts to center of 50" panel. Table size 20" x 27" (27" x 36" with wings). Blade tilts 45° to right. Lubricated-for-life ball-bearings in diamond-bored seats. Other Delta circular saws: 8" Tilting Arbor, and Tilting Table . . . 10" Tilting Table, 12" Tilting-Arbor . . . and 8" to 20" Radial-Arm types. At prices from $69.95 to $930.00.

Free!

6 TIMES A YEAR

The Power Tool Journal — packed with detailed job data, fully illustrated — handbook of time- and money-saving shop ideas!

Tear out this coupon and mail today!

Delta Power Tool Division
Rockwell Manufacturing Company
629B E. Vienna Ave., Milwaukee 1, Wisconsin

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☐ Catalogs and bulletins on complete Delta line.

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1. CLEANS FOUR TIMES AS FAST
2. CUTS TRIMMING TIME 25%
3. INCREASES LIFE OF TRIMMING DIES
4. SPEEDS PIERCING OPERATIONS 35%

At Haun Drop Forge Co., Ltd. installation of a Wheelabrator Tumblast replaced a number of tumbling mills for cleaning drop forgings. Because Wheelabrating is so much faster cleaning time was slashed 75%. It also provides a better-cleaned surface and improved finish which speeded up all operations which follow cleaning.

Trimming time is reduced 25% and piercing operations simplified due to the thorough removal of all scale. Whereas it had been necessary to clean the pressure plate used in trimming thin section forgings — requiring 30 minutes time every two hours — this costly time-consuming task has been eliminated.

Let Wheelabrator engineers show you how to conserve manpower and reduce costs in your cleaning and finishing department. There's no obligation, of course. Send today for details.

American WHEELABRATOR & EQUIPMENT CORP.
509 S. Byrkit Street, Mishawaka 5, Indiana
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

LETTERS
TO THE EDITORS

NPA Wants Facts & Figures

We are in the process of establishing a Metallurgical Advisory Board for the National Production Authority here in Washington; the information you published as Facts and Figures in your 1951 Yearbook would be valuable information to add to our increasing file if we could obtain a copy. The tabulation is very good; compliments are in order.

Veryl W. Graze
National Production Authority
Washington, D. C.

• *Copy being sent. Other readers interested may obtain them without charge from* STEEL's *Readers' Service Dept., 1213 W. Third St., Cleveland 13, O.*

Needs Help on Heating Problem

Can you put us in touch with some concern that has solved a heating problem similiar to ours? For the past 50 years we have heated our factory with individual stoves. It is now proposed to heat the plant by steam. This will require an investment equivalent to 40 per cent of our net worth. Will it pay?

Productive efficiency would undoubtedly be increased, but we are unable to form any definite estimate of the value of such an increase, or to determine how long it would take to recover the investment.

C. H. Wetzel, President
Wayne Iron Works, Wayne, Pa.

• *Perhaps some of you readers can help.*

Color Coding with Labels

The Dec. 25, 1950, issue of "As the Editor Views the News" carried a timely article on the identification of steels. We have often wondered why a standardized method of color coding various types of steel has not been developed. Without precise knowledge of the continuous ink stamping method you mention, it would seem that such a system would be difficult to use due to the variety of sizes and shapes.

The problem of marking steel is similar in many respects to the marking of pipes in industrial plants. The American Standards Association has a color coding system for pipes. It also recommends that names of materials conveyed be printed in large letters on approved background colors. A similar system embodying both printed names of steels and various background colors could be converted to the identification of steels. We have a system using the names on a white background, the markers to be attached every few feet. We would like to work with you to develop a uniform system of marking.

W. E. Schneider, Merchandising Mgr.
W. H. Brady Co., Chippewa Falls, Wis.

Society Appreciates Editorials

Just a note to express our appreciation of the grand editorial about SAE in your January 8 "Seen and Heard in the Machinery Field" column. You have put your finger on an aspect of SAE which many of us feel is most important, yet which is not always generally recognized.

Norman G. Shidle, Manager, Publication Div.
Society of Automotive Engineers, New York

The Metalworking Outlook

CMP—Will It Squash the Little Fellow?

Expect a Controlled Materials Plan to be in effect by the third quarter (p. 47). CMP will be harder on the little fellow in this part-war, part-peace economy than it was during World War II. Then, nearly everyone was making something for war and could qualify for materials. Now, it isn't feasible for some companies—chiefly small ones—to make defense goods. For materials, they'll just be getting what's left over after CMP skims the cream and more. The milk left will be pretty thin.

End-Use Limits on Steel Still Possible

There's still talk about end-use limitations on steel, despite the imminence of CMP. If end-use orders come, they'll probably arrive in the second quarter and will serve as stop-gaps until CMP can get into gear. Autos and appliances will be affected if anything is.

U.S. Buying Practices Hit

Small companies are complaining more loudly about effects of the speed-up in military buying. To hasten procurement, Defense can now negotiate for contracts and need not advertise for bids. The result: Overwhelming majority of all military contracts are now negotiated. Small business charges that the new procedure freezes it out. The situation encourages "5 per centers" who are already returning to the business scene.

Two Price Control Headaches

One of the biggest headaches for the price controllers: What to do about coal and iron and steel scrap prices. Two problems involved in bituminous and scrap will have to be solved again and again by ESA from now on for other commodities. In the case of coal: Will price boosts be allowed an industry when it has to grant wage increases? Lax wage controls make it virtually certain that rate hikes will be managed somehow. In the case of scrap: What to do about a commodity that's highly volatile pricewise—freeze it completely at a certain price or set a ceiling under which it may bob around?

More Wildcat Strikes Ahead?

The wildcat railroad strike is a hint of things to come. "Unauthorized" walkouts will be more common from now on as unions seek to win their point. Their issues in this era of controls will not be bare-faced wage demands but the guaranteed annual wage, more pensions, improvement factor clauses and more fringe benefits (p. 50).

Transport Controls Likely

The railroad troubles have spurred federal planning for more controls on the nation's transport system. A Transportation

Production-Engineering News—p. 75 · The Market Outlook—p. 157

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Committee is being planned by the Office of Defense Mobilization. Its purpose would be to co-ordinate the activities of all existing transportation agencies. The new group probably will be headed by Commerce Secretary Charles Sawyer.

Expansion: Industry Does It Alone

Expect no stampede for federal funds to finance the record metalworking expansion. RFC loans are increasing, but no volume of government aid is anticipated like that which was granted in the early days of World War II. Government's foot is in the free enterprise door too far already and metalworking generally is trying to minimize federal encroachment. Bethlehem Steel Co. Chairman Eugene G. Grace says that all of the $6 billion the steel industry has authorized for expansion since 1945 represents private investment.

Republic Takes a New Tack

Republic Steel Corp. and University of Chicago are co-operating on a fresh, solid approach to reveal the economic facts of life. A company-taught program to Republic employees gives the equivalent of a college course in basic economics. Chicago writes the course, then gets together with Republic and a compromise, unbiased approach is mapped. At the start of the program employees had an average score of 50 per cent right on economic questions. That's up to 75 to 80 per cent now.

Signs of the Times

Industrial Furnace Manufacturers Association after two and a half years of trying finally has persuaded Washington to set up an Industry Advisory Committee . . . The tool and die industry is getting alarmed about the increasing shortage of skilled labor . . . Decentralization of industry is expected to continue in 1951 . . . Recent college engineering graduates are 100 per cent employed, either by the armed forces or industry . . . RFC is considering the application of the new Green River Steel Corp. for a loan of about $8 million for electric steel facilities at Owensboro, Ky. . . . Expect a molybdenum order similar to the one on tungsten (pp. 48, 53).

Here and There in Industry

The M-30 order allocating tungsten is not yet causing a flurry among manufacturers of high speed steels (p. 48) . . . Expect tighter renegotiation laws (p. 49) . . . No electric power shortages are expected except in the Northwest and Southeast (p. 50) . . . Licensing of patents to foreigners is being encouraged by ECA (p. 51) . . . The new Gibraltar Steel Corp. plans a $100 million steel plant along the Detroit river (p. 52) . . . LP Gas becomes a major fuel (p. 57) . . . Military ordering boosts industrial activity (p. 65) . . . Barium Steel Corp. will neither confirm nor deny that it plans a major expansion at Phoenixville, Pa., involving a wide-flange plate mill and new standard plate facilities.

Playing By Ear

There is mounting evidence that the present crisis has caused Mr. Truman to play his important role of chief executive more by ear than heretofore. For almost two years he formulated policy on the questionable assumption that his unexpected election in 1948 was a mandate from the people to pursue his course "far left of center." Ever since Korea and particularly since Nov. 7 he has been more inclined to listen to criticism and in some matters to yield to it.

For instance, up to the middle of January he almost completely ignored inflation in his various messages and press conferences. This omission provoked widespread criticism which in time registered with the President. At a meeting of business paper editors on Jan. 19, he came out for the first time with a flat statement that the problem of inflation is on a par with that of aggression. Since that time, government thought and action regarding the threat of inflation has been stepped up appreciably.

It is to be hoped that a similar corrective move will result from "playing by ear" by the President on economy in government. For a long time he was completely blind to any aspect of economy in government. Mounting criticism in recent months has caused him on several recent occasions to declare defensively that he is economy-minded.

If he is really good at playing by ear, he will go much farther in the matter of economy. Instead of giving perfunctory lip service to it, he will promote it ardently. If he doesn't, then Congress should.

In a conference prior to Mr. Truman's tax message of last Friday, Senator Byrd stated that he is preparing a detailed blueprint of how the President's budget can be reduced by $9.1 billion. This is a revision of his previous proposal to save $7 billion. It deserves careful scrutiny.

The din of this recommendation for economy and the noise of criticism against the President's padded budget and the unnecessarily high level of his tax proposal should be made loud enough to cause him to change his tune.

E. C. Shaner

EDITOR-IN-CHIEF

LPG GOES TO TOWN: About a decade ago a trade association composed of producers and distributors of liquefied petroleum gas was seeking a spokesman for the steel industry to appear at its annual convention. Apparently the platform talent of the steelmakers was dated up on other assignments because in the end—at the urgent request of a major steel producer—this writer accepted the invitation.

The experience of appearing at that convention was enlightening. From beginning to end, it was evident that these people were in a young and rapidly growing industry. They were intensely enthusiastic about the future possibili-

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ties of their product. And yet, remembering back to that meeting, I doubt whether any of the industry's leaders actually believed it would progress as much as it has in the last decade.

A tip to the metalworking industry: LPG is a thriving industry and a customer well worth your intelligent cultivation. —p. 57

* * *

ELIMINATE IDLE TIME: It is gratifying to note the rapid growth of realistic thinking in regard to the proper utilization of some of the latest machine tools. Cutting speeds of 2000 to 20,000 surface feet per minute with carbide tools on ferrous metals are exciting, but they do not mean much unless other factors are brought into balance with this fantastic cutting time.

Michael Field and Norman Zlatin did a good job of emphasizing the need of this balance at the 1951 meeting of the Society of Automotive Engineers. They counseled that tool and production engineers concentrate on improvement of work loading, clamping and unloading methods—with special emphasis on multiple fixtures that permit loading and unloading in certain positions while work is being machined in other positions. A good slogan could be "First, eliminate all idle time from machining cycles; then strive for faster cutting speeds!" —p. 80

* * *

REAL HARDSHIP CASES: When the National Production Authority issues an "M" order allocating such scarce materials as copper, nickel or tungsten, the normal reaction of the public and of many persons in industry is to consider how the restrictions will affect the design and construction of certain products, such as automobiles, household appliances, radio and television, etc. There is general acceptance of the fact that the old rat race of finding acceptable substitutes again is the order of the day.

This concern for the product completely ignores the plight of many small companies whose very existence depends upon their specialized service in connection with one of the restricted materials. A case in point is the nickel plating specialists of whom there are many in motordom. Under existing circumstances they are out of luck, unless by some miracle they can hook onto war work in time. We ought to find ways to ease the hardships of these important specialists. —pp. 48, 49, 61

* * *

IMPROVING SINTERING: When blast furnace operators first experimented with sintering, it was looked upon as a means of disposing of flue dust. Today it is the industry's major process of agglomerating fine ores. The capacity of sintering plants in the United States now exceeds 18 million gross tons annually, which is more than a fifth of the gross tonnage of lake ores shipped annually. With more plants under construction, it is apparent that sintering is destined to play a more important role in iron-making economy.

A survey of 15 representative sintering plants shows wide variations in practice. The result in most plants is the recovery of the sinter's iron units without marked additional benefits to furnace practice. However, in two plants where sinter forms an integral part of the ore supply, the combined results of sinter and several other factors are beneficial. It would seem that further studies to determine the results of sintering more accurately are much in order. —p. 95

* * *

KILLING THE GOOSE: Department of the Interior has put out some disconcerting figures. Of the 7.7 million kw in electric power generating capacity being placed in operation in 1951, 24.7 per cent will be government expansion and 75.3 per cent will be privately owned. That the government by sly tactics has been able to garner a quarter of new facilities is deplorable.

Even more damning is the matter-of-fact statement that if there is to be an electric power shortage, it will be in the Southeast and Northwest where government facilities are preponderant and where private utilities will not expand for fear of being frozen out by Uncle Sam.

Here is the ugly picture: No power shortage where private enterprise has freedom of action; probably serious shortages where the federal government has scared out private operators.

—p. 50

CMP Pushed as DO Plan Falters

NPA starts blueprinting an organizational setup and program details, probably to be implemented sometime in the third quarter

THE DO PRIORITY system is working on only three or four cylinders, a STEEL survey shows. National Production Authority is hurrying the engineering on its eight-cylinder Controlled Materials Plan, but can you get by until July, the earliest such a program could be ready?

Lack of an administrative staff may postpone implementation of CMP until late in the third quarter. If greater haste appears necessary, NPA will do the job piecemeal—a CMP on copper and aluminum first, then steel. NPA thinks that allout controls will be necessary for only those, as in World War II, because restrictions on the big three will regulate indirectly the consumption of most other materials.

He Wants It—Strong advocate for CMP as early as possible is Acting NPA Administrator Manly Fleischman. He has Defense Production Administrator William H. Harrison convinced and they have given Walter C. Skuce the job of blueprinting CMP and organizing a staff to ride herd on it. Mr. Skuce, now an NPA staff assistant, had charge of the operation of CMP during World War II. He's working now with July 1 as his tentative target date to have at least a program ready.

Details of the plan will be determined partly by returns on an NPA questionnaire to 8000 metalworking plants on inventory, consumption and other subjects.

Signs of a Breakdown—The government decision to push up the timetable for a shift to CMP reflects growing dissatisfaction with the DO system. A STEEL survey of major metalworking centers reveals that most purchasing agents expect a general breakdown of the system by midyear. Nearly everyone interviewed says that some tighter controls are necessary, CMP being the probable answer.

A railroad equipment builder made the strongest qualification to that stand. He thinks the DO setup should be given a more thorough trial. "DO hasn't failed," he says. "It hasn't really been tried." Less than 15 per cent of the representative companies queried said they had insufficient experience with DO to pass judgment.

Several companies, notably a manufacturer of casting and forging specialties, say that DO is working in reverse and thus causing hardships. Some component suppliers are arbitrarily refusing to do business with anyone who has no DO rating, a step not sanctioned by any federal directives.

Faster Action—If a CMP is operating by midyear, it will come faster than during World War II. Then, a plan wasn't implemented until April 1, 1943, nearly 16 months after Pearl Harbor. World War II CMP was the fourth and most successful control program tried.

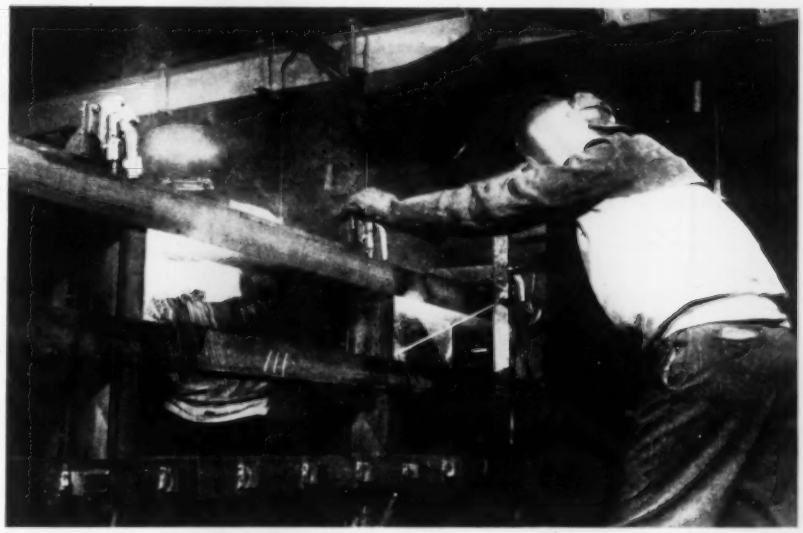
First came priorities with their myriad of A, AA and AAA ratings. They died of their own weight to be replaced by a War Production Board program of unrelated allocations. That ultimately collapsed because of lack of an overall direction and was replaced by a modified scheme—Production Requirements Plan administered by WPB. That sought to systematize the unrelated allocations. Out of PRP grew the more comprehensive CMP.

Phantom Orders Coming to Life

The Munitions Board has sent out tentative orders covering 40 per cent of 100,000 machine tools in the phantom-order program drawn up in 1949.

Builders have been asked to indicate whether they can produce the tools, and to suggest any changes in specifications desirable now. When the Munitions Board gets its answers, the proposed orders will get a final screening; then the actual production orders will be issued.

In another program affecting the machine tool industry, NPA's Machinery Division aims at getting increased production of most-needed types of machinery to take care of growing military requirements. Part of the plan is to permit more extensive use of the DO-98 priority rating to obtain tools needed to fulfill defense contracts. Also under consideration is an order which would provide priority assistance to machine tool and other machinery manufacturers in obtaining materials to turn out defense equipment.



BAILEY BRIDGES AND PRIORITIES
. . . will the DO system or CMP best serve defense production?

Olds Sees CMP Need Soon

Government financing of steel mills is unwarranted unless these mills are vitally needed and the materials, equipment and manpower re-

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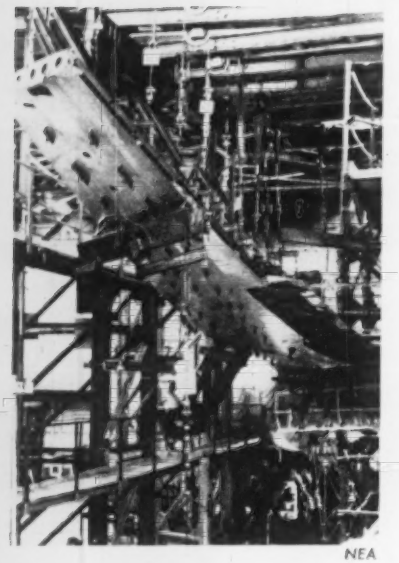


NEA

IT CAN TAKE IT: While subject to severe strains and stresses should it be placed in combat, this B-47B Stratojet bomber wing is undergoing even more severe tests. Boeing Airplane Co., Seattle, is forcing the wing upward over 11 feet. In the final test it is deflected upward and downward more than 20 feet. Test equipment makes use of over 10,000 feet of steel hydraulic pipe. Closely watching their dials are these Boeing testing personnel operating the hydraulically-powered jacks for testing the Stratojet wings. The test engineer (standing, with telephone) is in constant touch with men stationed at all points of the plane being tested to assure even load distribution. Another bank of controls, not shown, is also used in the test. Torture test conditions are in excess of those encountered in years of normal combat flying

NEA

quired are available. It is the feeling of Irving S. Olds, chairman of the board, United States Steel Corp., that government-financed facilities are not necessary because the steel industry has shown the desire and ability to meet expressed government ideas on future requirements.

His company's plans for expansion will increase capacity by 13.4 per cent of the previous rated capacity by the end of 1952. This will be supplemented by another mill to be built in southern California, plans for which have not been drawn up.

As demand increases for a considerable percentage of a product, we should have CMP, says Mr. Olds. This point has about been reached, he says.

Twin Coach Makes Army Busses

Contract for making 1650 Army transport busses has been awarded to Twin Coach Co., Kent, O., the total consideration being $21,450,000. Of a type specially designed to meet requirements of the Highway Transport Corps, U. S. Army Ordnance, Air Corps and the surgeon general, the vehicles can be converted from bus to cargo truck or field ambulance in a short time. Employment at the company's plant will be expanded from the present 1200 to about 1800.

Scaife To Make Mortar Shells

A $6 million contract with the Department of the Army will enable Scaife Co., Oakmont, Pa., to produce mortar shells for the defense effort. Normal production of pressure vessels for air, gas and liquids will not be curtailed, says A. V. Murray, president.

Tungsten Order Mild

Technical advances, alternate materials lessen impact of NPA order M-30 limiting end uses

EFFECT of National Production Authority order M-30 for allocating tungsten seemingly is causing no flurry of excitment among manufacturers and users of high speed steels. Segments of industry affected by the order, which takes effect Mar. 1, operated under similar conditions during World War II; they are drawing upon this experience in the present emergency.

The order states that producers must make at least 80 per cent (by weight) of their high speed steel with 6.75 per cent or less tungsten and not more than 20 per cent with 12 per cent or more of the critical material. Users cannot order or receive more than 20 per cent of their total requirements monthly in class B steel (12 per cent or more tungsten). Restrictions do not apply to those using less than 500 pounds of class B steel in any quarter.

Deficiency Diet—Molybdenum and vanadium, especially the former, are being used to offset the tungsten deficiency. Molybdenum, like tungsten, is subject to government order, but is available domestically. It is being used in higher percentages in high speed steels to offset the reduced amount of tungsten available. One producer contacted by STEEL said that of the companies forced to change to "moly" steels during the recent war, many never went back to the tungsten types.

Several technological advances have lessened the effect of the tungsten-limiting order. Most producers have a series of cutting steels, each for a different application; these have been defined by years of experimentation. One of the biggest advances has been in heat treating; improvements here have offset many shortcomings of molybdenum steels as compared with tungsten steels.

At present the price differential is in favor of the "moly" high speed steels—its cost is about 35 cents a pound less. This factor has influenced some users, will influence more.

Life Spans Compared — Opinions differ on the life expectancy of the two types of cutting steels. On many applications, there probably will be no marked difference. But tools of the shaper and reamer type will miss the tungsten in their metallurgy. The 20 per cent class B tools which still can be made should cover these severe-action tools.

Producers, warehousemen and users alike seem confused on various facets of the order. One office does not know how to make orders now on its books comply with the directive. Another company, a producer, interpreted the order to not include steel containing as much as 18 per cent tungsten, but used in hot work (forging dies, etc.).

A high speed steel user in the Cleveland area has been told to expect 14 to 16-week delivery on tungsten steels—and this may be extended before the delivery date. Molybdenum steels are available in 3 to 4 weeks, not too far from normal for the last few months.

Low Grade Tungsten Processed

Tungsten ores, middlings and low grade tungsten concentrates will be

purchased by Electro Metallurgical Division, Union Carbide & Carbon Corp. The company's mine and mill at Pine Creek and Bishop, Calif., will process pond sludges, slimes and magnetic rejects for conversion into high grade concentrates, so great is the need for tungsten in the defense program.

Both mine and mill are operating at peak capacity; a program is underway to provide additional mill capacity. Mining activities were formerly operated as United States Vanadium Corp., a UCC subsidiary.

Where You Can't Use Nickel

Use of nickel in a wide variety of products is prohibited by an amendment to NPA order M-14. But the order does allow these items to be manufactured with other materials. The original order limited nondefense consumption of nickel during the first quarter of this year to 65 per cent of the average quarterly use during the first half of 1950.

The amendment lists products in which nickel silver or nickel plate may not be used beginning Mar. 1 and items in which nickel bearing stainless steel or high-content nickel alloys may not be used beginning Apr. 1. A two-month period is provided to permit completion of articles started before these dates.

Cases involving the use of nickel not affected by this amendment to order M-14 will continue to be covered by the 65 per cent limitation of the original order. Provisions of the original order have been extended to include nickel salts, chemicals and residues derived as a by-product of copper refining.

Definitions of the four forms of nickel covered are: 1. Nickel silver—wrought or cast nonferrous alloys containing over 8 per cent nickel; 2. nickel plating—all plating, regardless of procedure of application; 3. stainless steel—wrought or cast chromium-nickel iron base alloys containing 6 to 22 per cent nickel; 4. high-content nickel alloys—wrought or cast ferrous or nonferrous alloys with over 22 per cent nickel.

For list of products covered in the four categories see page 180.

Bethlehem Builds Lake Boats

Bethlehem Steel Co. will build two new lake ore boats at Sparrows Pt., Md. The carriers will be the first such ore vessels ever built outside Great Lakes shipyards.

They will be 620 feet long, 70 feet wide and will have an ore-carrying capacity of 17,000 to 18,000 tons. Each boat will cost $6 million and will be operating in 1952. Government engineers in charge of inland waterways are going to help Bethlehem solve the problem of getting the vessels through the canals. Bethlehem received the contract because Great Lakes yards are booked to capacity through 1953.

Shipbuilding and repair orders on hand at the end of 1950 totaled $73 million. Bethlehem's total order backlog at the yearend was $607 million, compared with $417 million at the end of 1949. Bethlehem's steel shipments last year totaled a record 10,933,000 tons, compared with 9,217,000 tons in 1949. Output for 1950 was 15,116,000 tons, against 12,597,000 in 1949.

Surplus Ship Sales Total 1960

American ship operators bought 131 war-built merchant ships from the Maritime Administration between Jan. 1 and Jan. 15, 1951. This brought the total number ships sold under the Merchant Ship Sales Act of March, 1946, to 1960, at an aggregate sales price of $1,728,821,057, says Admiral E. L. Cochrane, Maritime Administration, U. S. Department of Commerce. Of this number, 847 were for American operation and 1113 were for foreign flag operation. The act expired Jan. 15.

Tighter Renegotiation

A House bill, yet to be acted on by the Senate, would make more U.S. contracts renegotiable

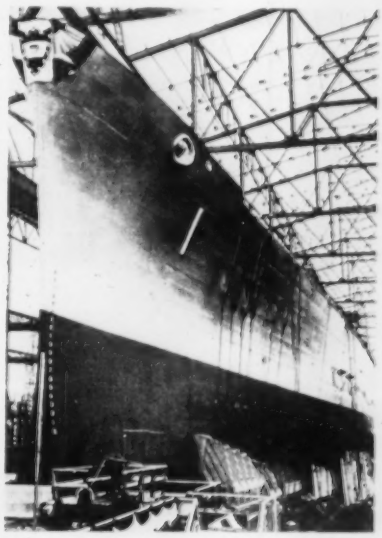
UNDER the House bill, still to be acted on by the Senate, renegotiation covers a much broader area than before.

The bill would make subject to renegotiation moneys received or accrued by a contractor and related subcontractors on or after Jan. 1, 1951, in an amount of over $100,000 in 1 year. It applies where contracts are made with the Departments of Defense, Army, Navy, Air Force, Commerce, the General Services Administration, the Atomic Energy Commission "and other agencies exercising functions in connection with the national defense which the President shall designate."

Tighter Provisions—Contract brokers would be renegotiated for any year in which they have receipts and accruals of $25,000 or more.

The renegotiation board also would have a certain amount of discretionary power in determining whether renegotiation is desirable or undesirable in connection with certain contracts—as where manufacturing costs can be accurately determined when the contract is negotiated in the first place, or where the renegotiation process might jeopardize secrecy required in the public interest.

ACID GOES TO SEA: Waste industrial acid will be removed from Columbia Steel Co.'s Pittsburg, Calif., plant by this converted landing ship. Equipped with a solid prow and four steel tanks fabricated by Consolidated Western Steel Corp. at South San Francisco, the former Navy vessel will be operated by Bay Cities Transport Co. Tanks, measuring 15 feet in diameter and 40 feet long, will be lined with rubber ←



DOWN TO THE SEA: Recently getting its first taste of salt water was the U. S. S. Northampton, a 17,000-ton command ship, shown here before launching. Built at the Quincy, Mass., yard of Bethlehem Steel Co., the Navy ship is the first launched there since 1947 →

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No Power Shortage

Utilities will continue expansions to meet heavier demands, except in Northwest, Southeast

NO SERIOUS power shortages for industry except in the Northwest and Southeast. That's what private power companies expect after assurances from the Department of the Interior that their ambitious expansion programs will not be materially curtailed.

If electric power does become tight, new residential consumers will be cut off before industrial users. Shortage of copper and unskilled labor are limiting factors in the industry's expansion. If all goes well, facilities to produce 475 billion kwhr a year will be completed by 1960. That would be 70 per cent more than the estimated kwhr sales of 279.7 billion in 1950. Industry generally expects to increase its physical output by only about 50 per cent in the next ten years.

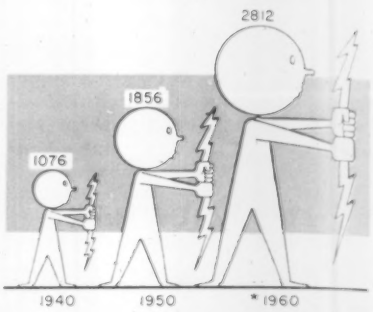
Up and Up — The 1950 level of power generation was 12 per cent above 1949. By 1955, kwhr sales will approximate 389 billion. Industrial power sales by mid-1951 may climb nearly 20 per cent above the level for the comparable 1950 date. Residential sales will also rise, but only 10 to 15 per cent. The 1951 peak load may exceed 1950's by 12 per cent.

The utilities ordered about 11 million kw in generating facilities in 1950, a new record. Purchases last year exceeded production by 33 per cent. Now, the utilities have on order an estimated 19 million kw in generating equipment.

Behind the Scenes — The power shortages that are expected to persist, in the Southeast and Northwest of the U. S., are in areas where public generating facilities are preponderant. Private utilities aren't expanding there for fear of being frozen out ultimately.

Of the 7.7 million kw in generating capacity being put into operation in 1951, 1.9 million or 24.7 per cent will be government expansion and 5.8 million or 75.3 per cent private. The trend toward government ownership is gaining. By the end of this year, 79.3 per cent of all generating capacity will be privately owned, and 20.7 per cent publicly owned. The ratio was 8[illegible] per cent to 20 per cent in 1949, probably will be 78-22 by 1953.

Electric Power Consumption
. . . kwhr per capita



*Estimated

In an Era of Controls UAW Takes a New Tack

WHAT will the unions demand of management in the coming era of controls?

Walter P. Reuther, president of United Auto Workers-CIO, gives a hint in his union's report to the membership. He outlines this five-point program:

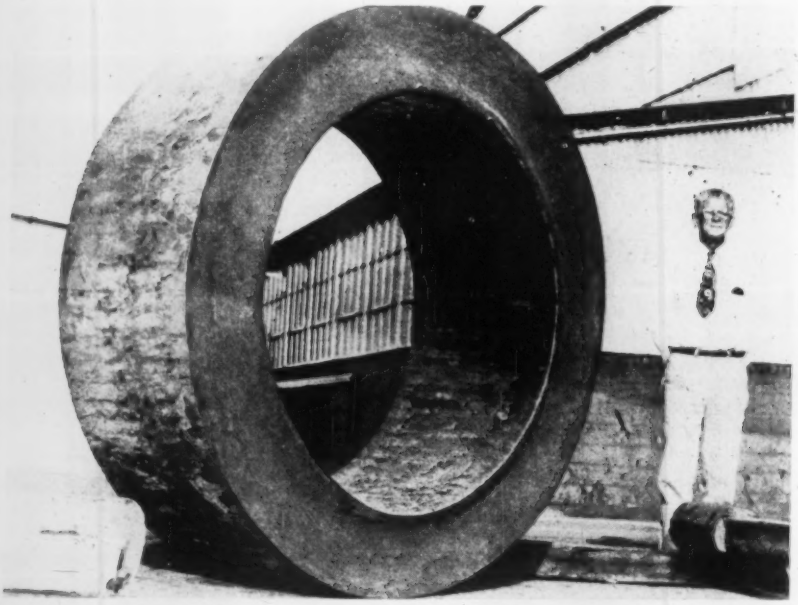
Escalator Agreements—He likes the five-year agreements with escalator clauses and annual improvement factors. Every major auto company except Willys-Overland has signed the GM-type contract and negotiations are in progress with Willys. The UAW will campaign to get the smaller companies into the fold and presumably will seek contract extensions when the existing agreements run out—mostly in 1954.

Guaranteed Annual Wage — The UAW will call upon management to join it in the establishment of a labor-industry annual wage commission to study all possible means of achieving a guaranteed annual wage. That issue, dormant for the past few years, first was a serious bargaining point just after the war. Mr. Reuther says it will be a major issue from now on. He claims that if management has to pay a yearly wage, it will plan its production schedules better.

Pensions—Another major issue will be increased pension benefits paid entirely by industry. The UAW will push for a minimum of $200 per month in pensions for members, compared with $125 now. The union will also press for provisions in the pension trust fund agreement that will allow the worker's equity in the fund to follow him from job to job.

Vacations—Vacation pay provisions of present contracts give much of the UAW membership 120 hours' pay. "In the future," Mr. Reuther discloses, "we shall press for 160 hours' vacation pay with lower seniority requirements."

Health Benefits—About 1 million auto industry workers are covered by hospitalization programs in which the companies foot at least half the bill. Complete company financing is the UAW goal, as is a national health program. The union proposes to win that issue both through collective



ORE CRUSHER COMPONENT: Weighing 19,000 pounds, this giant ring forging was made by punching a hole in a solid chromium-nickel-molybdenum steel slug, then forging it over a mandrel. Torrance, Calif., plant of National Supply Co. did the job. With others of equal size and weight, it will be shipped to Inspiration, Ariz., for use as a roll shell in an ore crusher at Inspiration Consolidated Copper Co.

bargaining and national legislation. Greater disability and sickness benefits also will be sought. At the coming UAW convention, Mr. Reuther will recommend establishment of a union insurance company "to handle the insurance of 1,250,000 members on a mutual non-profit basis."

For the short term during the shift from civilian to defense production, a program of federal aid to workers has been suggested by Mr. Reuther to President Truman. The amount of such grants, says the UAW president, should be equal to the difference between a worker's normal 40-hour week wages and present state unemployment compensation.

Syracuse Braces for Conversion

Syracuse, N. Y., companies are advertising what they can build for defense. Firms in Onondaga county, in which Syracuse is located, make products in all 20 of the major industrial classifications. The county's one of only 33 of the 3050 in the U. S. to be so widely diversified.

Many products will be nonessential as the more than 400 manufacturing plants in the area have banded together, through their Manufacturers' Association of Syracuse, to put out a buyers' guide. Conversion activity in the area has started but is not yet widespread.

Employment in the county now exceeds 59,600, close to the World War II peak of 61,000, and 65 per cent above the level a decade ago when employment was only 36,200.

Major problems of manufacturers are manpower and materials. Some producers in the area are beginning to hire on a part-time basis. Engineering and purchasing staffs are stepping up their efforts to find substitutes for scarce steel, aluminum, copper and bronze.

More Firms Seek Defense Orders

Youngstown area fabricators established a defense works division to steer defense orders to smaller firms, says Carl Gangloff, secretary, Greater Youngstown Area Foundation. About 90 small plants contributed to establishing the new department, listing their manpower, facilities and capacity for the attention of government procurement agencies.

Royal Metal Buys Factory

A new factory in Los Angeles now belongs to Royal Metal Mfg. Co. of California, says J. K. Salomon, president, who is also general manager of the parent corporation, Royal Metal Mfg. Co., Chicago.

ECA Boosts Licensing

You may get income from patents for nonessential items by letting foreigners use them

WORRIED about the ultimate fate of your nonessential civilian product? You may be able to receive some income from your patents, processes and industrial techniques for both nonessential and essential items by licensing Western European companies to use them.

ECA's Office of Small Business, through its Washington and Paris offices, is bringing together American companies and foreign firms in Marshall Plan countries that are interested in contracting to use American patents, services and in some cases equipment. ECA believes that many small and medium American firms manufacture products which would have a market in Europe, even though export of the products is not practical.

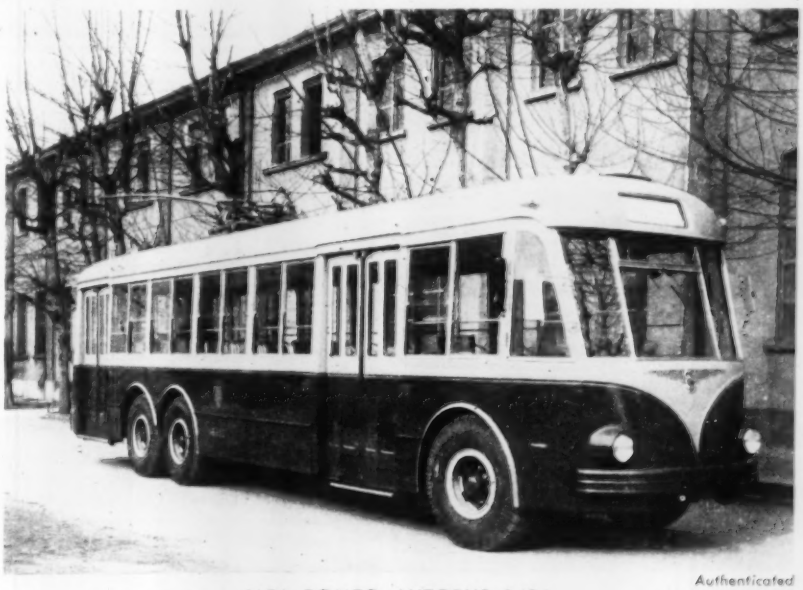
The Answer—The solution, ECA says, is for those firms to license foreign companies to manufacture and market abroad their products. Available for the encouragement of that and other types of foreign investment is a fund of $200 million with which Congress has authorized ECA to protect American investors in Europe. Under the terms of the present guaranty provision in the ECA act, large or small businessmen who invest in or license foreign producers in Marshall Plan countries may, if the investment qualifies, obtain a guaranty of convertibility into dollars of their foreign currency receipts.

The value of investments by American corporations in their foreign branches and subsidiaries rose by a record $1.3 billion in 1949 to reach a total of $12.5 billion at the end of that year, Commerce Department's Office of Business Economics says. The increase of American direct investments abroad was somewhat smaller in 1950 than in 1949.

Money in Oil—A little more than half of the total increase in such investments abroad in 1949—$700 million—was by the petroleum industry, representing expenditures to carry forward major postwar projects such as refinery facilities in Venezuela, pipe lines in the Middle East and the building up of foreign flag tanker fleets. The virtual completion of the programs was the primary factor in the moderate decline in capital outflows in 1950.

Next to the petroleum industry in importance was the manufacturing industry which invested about $300 million abroad in 1949. The largest investments by that industry are in Canada.

Money in the Ground—A period of expansion in mining investments abroad was inaugurated in 1949, although the investments in that year—$70 million—were not great. Plans for developing new sources of iron ore in Canada and Venezuela, and of other raw materials available in the Western Hemisphere, call for the investment of about $1 billion in that area in the next few years. Large projects are also under consideration for other areas, particularly Africa.



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. . . when export of products isn't practical, license foreign companies

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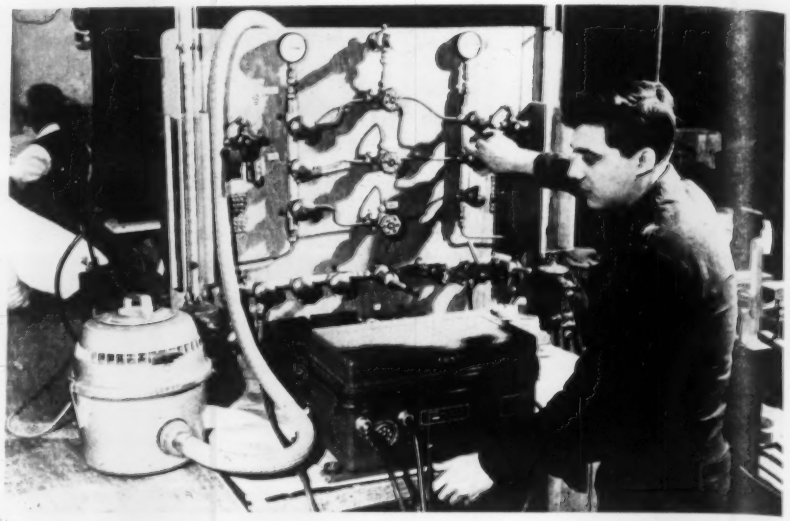
TV Output Still High

January production of television sets was off slightly from the fourth-quarter level as producers continue to assemble parts previously fabricated. But the outlook is for a sharp production curtailment by midyear.

In 1950, 7,250,000 sets were produced; present estimates for 1951 range between 3 and 3.5 million. The industry once thought it would make 10 million receivers this year.

Expected cutbacks will come because of shortages in plant facilities and materials, not because of the limitations on consumer credit. Westinghouse's new plant near Newark, N. J., originally intended for television production by the end of 1951, will be converted completely for production of military items. GE's television production at Syracuse, N. Y., will be crimped because more space is needed for defense output. The industry is hard hit by shortages of steel, copper, nickel, cobalt and even packaging materials.



INSPECTION BY VACUUM CLEANER: This household vacuum cleaner is testing Signal Corps ground radio communication sets for watertightness. Rather than test a set in water and then find it damaged if a leak is found, Lewyt Corp., Brooklyn, N. Y., is using the vacuum created by its cleaner to simulate the water test. If the vacuum is held at a specified level for the required time, the set is immersionproof. Radio equipment, which has a 40-mile range, is being made on a Lewyt-held $5 million contract

Alcoa Adds Capacity

Arkansas plant to increase alumina production of company by nearly 50 per cent

CONSTRUCTION is to begin immediately on a new alumina plant near Bauxite, Ark., the facility to increase Aluminum Co. of America output of the material by nearly 50 per cent. Low grade bauxite ore from the adjoining operations of Alcoa Mining Co., a subsidiary, will be processed. Alumina is the refined ore from which basic aluminum is obtained by smelting.

Plant will make use of a combination lime soda-Bayer process, developed by the company during World War II to permit economical use of the low grade ore. The proposed work will employ 1000 persons. Expansion of housing facilities to accommodate the workers will be necessary. The entire construction project will be carried on by the company, serving as its own general contractor.

AIIE Holds Work-Factor Talks

Work measurement and increased production are the topics to be discussed at a conference sponsored by the Cleveland Chapter of the American Institute of Industrial Engineers, February 9 at the Hotel Statler. Martin C. Miller, Republic Steel Corp., chairman of the conference, said that the conference has been arranged to provide instructive sessions on the work-factor method of time and motion study. J. H. Quick, president of the Work-Factor Co. will demonstrate the system.

Chicago Trade Fair Cancelled

Unstabilized world conditions have resulted in the cancellation of the second United States International Trade Fair, scheduled for Chicago, Sept. 8 to 23. Directors are thinking of resumption in March, 1952, says Col. John N. Gage, managing director.

Plate Fabricators Keep Officers

Officers of the Steel Plate Fabricators Association are being retained because the organization felt it inadvisable to make a change during the national emergency.

Re-elected at the association's annual meeting in Chicago are: President, J. E. O'Leary, vice president, Pittsburgh-Des Moines Steel Co., Pittsburgh; vice president, Robert J. Ryan, executive vice president, Nooter Corp., St. Louis; treasurer, William S. Wheeler, president, Pennsylvania Engineering Co., New Castle, Pa.; secretary, J. Dwight Evans, and executive director, Tom R. Wyles, both of 37 W. Van Buren St., Chicago.

New directors elected are: Robert I. Ingalls, chairman, Birmingham Tank Co., Birmingham; O. H. Lange, vice president, Hibben & Co., Chicago; J. P. Murray, secretary, National Annealing Box Co., Washington, Pa.; E. N. Gosselin, chairman, Graver Tank & Mfg. Co. Inc., East Chicago, Ind.; and J. A. Weaber Jr., president, Union Boiler & Mfg. Co., Lebanon, Pa.

More Sheet for Detroit from Gibraltar Steel Corp.

MORE steel for the voracious Detroit area is promised in the plans for an 800,000-ton integrated steel plant to be built on the Detroit river near Trenton by a new company, Gibraltar Steel Corp.

Principals of the new company believe the capacity figures may be doubled or even tripled before building plans get under way.

Cyrus Eaton, Cleveland financier and head of Otis & Co., investment firm, will be chairman of the new company. President will be Max Zivian, who also is president of Detroit Steel Corp. Carlton M. Higbie, president of Higbie Mfg. Co., will be vice president and chairman of the executive committee.

Initially the company plans to build a 1500-2000-ton blast furnace, four open hearths, between 50 and 60 coke ovens, a blooming mill and continuous hot and cold strip mills. Principal product will be full finished sheet.

Company will use Steep Rock iron ore. Limestone and coking coal are

readily available. The Detroit area provides an excellent market for sheets.

Gibraltar officials are seeking a certificate of necessity for the new $100-million plant and will ask for a government loan to help finance construction.

Rust Controls Go to U. S. Steel

Material for automatic controls and engineering services for a four-hole battery of regenerative soaking pits at U. S. Steel Co.'s South Works, Chicago, will be furnished by Rust Furnace Co., Pittsburgh. Controls for temperature, combustion and furnace pressure are included.

Gerity Holds Pilot Plant Line

Gerity-Michigan Corp. will continue to operate the Air Force manufacturing methods plant at Adrian, Mich., during February. After operating the plant in 1950, Gerity officials protested when Reynolds Mfg. Co. of Richmond, Va., got the contract for 1951. The one-month delay will permit a review by Air Force officials.

Detroit Steel Adds Facilities

Joining the parade of new and enlarged steelmaking facilities is Detroit Steel Co., which has charted ingot and finishing capacity expansions at its Portsmouth, O., works. In a $50 million program, ingot capacity will be doubled to 1,290,000 tons annually and finishing capacity raised from 180,000 to over 1 million tons. A major share of the program will be subject to accelerated amortization under a Defense Production Administration certificate of necessity.

Facilities to be added include: A second blast furnace rated at 1400 tons, four 250-ton open hearths, a high lift 48-inch blooming mill, a five-stand 54-inch hot strip mill, a three-stand 54-inch cold rolled sheet mill, and additional soaking pits, annealing furnaces, pickling, slitting, flattening and cut-off lines.

Ford Expands Coking Plant

Koppers Co. Inc., Pittsburgh, will design and construct for Ford Motor Co. a battery of 37 chemical recovery coke ovens and additions to Ford's coal chemicals plant at Dearborn, Mich.

The ovens will furnish metallurgical coke in making additional iron for three planned Ford foundry facilities: The engine plant foundry near Cleveland, the specialty foundry at River Rouge and expansion of the iron works at Dearborn. Completion of the ovens is scheduled for early 1952.

Keystone Builds Open Hearth

To further increase its capacity, Keystone Steel & Wire Co., Peoria, Ill., is building a new open-hearth steel furnace. Expansion plans also call for enlarged soaking pit facilities to reheat steel ingots, a move necessitated by the increase in steel ingot capacity. Soaking pit project will cost $330,000.

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CHECKLIST ON CONTROLS

★★★★★★★★★★★★★★★★★★★★★★★★★★

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg. Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Materials Orders

TIN—Amendment on Jan. 27, 1951, of NPA Order M-8 prohibits after Mar. 1 the use of pig tin, tin alloys or other materials containing tin for a number of specified purposes except upon the specific direction of the NPA. All uses of tin not expressly authorized by NPA are prohibited and certification as to the uses is required with all deliveries. NPA Order M-8, as amended Jan. 27, 1951. Effective Jan. 27, 1951.

TIN PLATE, TERNE PLATE—M-24 specifies for what purposes tin plate and terne plate may be used and states the maximum coating of tin or terne metal permitted in each case. A manufacturer whose annual consumption of tin plate and terne plate is 100 base boxes or less may continue his present operation, if the items produced are not prohibited in List A of NPA Order M-8 as amended Jan. 27, 1951.

CANS—M-25 prohibits the use of cans made in whole or in part of tin plate or terne plate for any purpose other than for packing products listed in Schedule 1 of the order. Canners of non-food products listed in the schedule will be permitted to pack 90 per cent of their first quarter 1950 or first quarter 1949 base. NPA Order M-25. Effective Jan. 27, 1951.

TIN PLATE CLOSURES—M-26 specifies the products for which tin plate closures may be used in their packing and lists the weights of tin coating permitted. The number of closures that may be used is not restricted. NPA Order M-26. Effective Jan. 27, 1951.

COLLAPSIBLE TUBES—M-27 stipulates the purposes for which collapsible tubes containing tin may be used and specifies the amount of tin permitted for the various uses. This order also limits the use of aluminum in the manufacture of collapsible tubes to 90 per cent of the average monthly use of aluminum for this purpose between Aug. 1, 1950, and Nov. 30, 1950. NPA Order M-27. Effective Jan. 27, 1951.

MOLYBDENUM—M-33 limits molybdenum inventories to a 20-day supply. Under NPA Regulation 1, molybdenum inventories were previously limited to a "practicable working minimum." NPA Order M-33. Effective Jan. 27, 1951. In addition to issuing M-33, NPA issued directives to producers, handlers and marketers to make no deliveries of molybdenum in any form on orders except those having DO ratings, or those nonrated orders for molybdenum to be used in high speed steels. The directives also instruct producers, handlers and marketers to deliver not in excess of 50 per cent on either DO orders, or on nonrated orders for molybdenum to be used in high speed steels.

IRON & STEEL SCRAP—Amendment of Jan. 29, 1951, of NPA Order M-20 provides that NPA can increase or decrease iron and steel scrap inventories in the hands of consumers and allocate scrap and specifically direct the manner and quantities in which such deliveries shall be made. NPA Order M-20, as amended Jan. 29, 1951. Effective Jan. 29, 1951.

Delegations

ALUMINUM—Supplement 1 to NPA Delegation 1 as amended permits the secretary of defense and those to whom he in turn re-delegates this authority to reschedule deliveries of all types of aluminum forms and products used in the military aircraft and guided missiles programs. This means that aluminum scheduled to be delivered to one manufacturer under either of these programs can be diverted when necessary to another manufacturer working on these programs. Supplement 1 to NPA Delegation 1, as amended. Effective Jan. 25, 1951.

NPA Machinery Division Personnel

Temporary T Bldg., Room 2134
Telephone STerling 9200
Extensions 4550 and 4688

Director: Marshall M. Smith, former president, E. W. Bliss Co., Brooklyn, N. Y. Assistant Director: William L. Beck, from Commerce Department.

Machine Tool Section Chief: Col. P. L. Houser, from International Harvester Co., Chicago.

Machine Tool Section Assistant Chief: Paul S. Gaston, Washington, has machine tool interests in Detroit.

Machine Tool Consultants: E. Payson Blanchard, from Bullard Co., Bridgeport, Conn.; Herbert L. Tigges, from Baker Bros., Inc., Toledo, O.; Robert M. Husband, Fort Wayne, Ind., retired machine tool distributor; Edgar J. Seifreat, president, from Seifreat-Elstad Machinery Co., Dayton, O. Andrew S. Carey, who has an interest in Carey Machinery Co. of Baltimore and Washington.

Information Officer: Louis H. Gerteis, 5004 Commerce Bldg. Phone STerling 9200,. Exts. 4445 and 4627.

UNIVERSITY OF MICHIGAN LIBRARIES

Windows of Washington

By E. C. KREUTZBERG Washington Editor, STEEL

Because labor union leaders hesitate to tell how many members they represent, it's hard to get the correct figures. Best estimate: Between 14 and 16 million

WHILE THERE is no accurate count either in or outside the government it is quite well established that membership in labor unions in the U.S. is considerably smaller than generally believed. Best currently available information, from a careful check by a Labor Department official, is that "the estimated number of workers in unions in the United States has varied between 14 million and 16 million for the past two years." Reason for this lack of correct statistics is that labor union officers hesitate to disclose how many members they represent.

The government has available a booklet which should be valuable to many students of labor union activities. It is "Bulletin No. 980 of the U.S. Department of Labor" and copies may be had, under the title "Directory of Labor Unions in the United States," from the Superintendent of Documents, Government Printing Office, Washington 25, at 25 cents.

The booklet lists all the labor unions in the country—209 in number—their addresses, names of officers, telephone numbers and whether they are independent or affiliated with the AFL or CIO.

Scrap Men Need the Room . . .

The large space in Room 3819, Commerce Bldg., has been assigned by the NPA Iron and Steel Division to its Scrap Section which has the tough job of administering Order M-20, as amended, to provide spot assistance to consumers in need of scrap in order to maintain their production schedules. Marvin H. Plant, chief of the section, who comes from the H. Klaff Co., Baltimore, has these assistants: Charles M. Brooks, Luria Bros. & Co. Inc., Reading, Pa.; Boyd Outman, Columbia Iron & Metal Co., Cleveland; John P. Voyer, Republic Steel Corp., Cleveland; Stuart J. Heiss, Inland Steel Co., Chicago; and Ben H. Pritchard, Youngstown Sheet & Tube Co., Youngstown. All can be reached by phone on STerling 9200, Ext. 4181 and 4520.

Another Manganese Project . . .

Another new manganese project undertaken by the Bureau of Mines is to develop a method of recovering manganese from the low-manganese silicate ores of which there are extensive deposits in Colorado. The work is being done at the bureau's Salt Lake City station.

Look Out for Opportunists . . .

Chairman James M. Mead, Federal Trade Commission, is directing the FTC staff to be on the watch for "opportunists in the business world who may seek to exploit consumers and the government during the national defense emergency." Firms that mislead customers with respect to substitutes used during the period of materials scarcities will be pulled up sharply. In addition, FTC "has a definite task to perform in seeking to prevent the growth of the concentration of economic power such as occurred during World Wars I and II."

Aircraft Design Trends . . .

Manufacturers doing business with the aircraft industry can get a remarkably clear picture of design trends and research objectives in this field from the 36th Annual Report of the National Advisory Committee for Aeronautics. Copies of this 70-page book may be had at 40 cents from the Superintendent of Documents, Government Printing Office, Washington 25. It is a compilation of NACA project records.

Want Nuclear Training?

Interested in getting special training in nuclear reactor technology for experienced engineers in your employ? If so, you're invited by the Atomic Energy Commission to sponsor their enrollment in the 1951-52 session of the Oak Ridge School of Reactor Technology. Applications, for which an April 1 deadline have been set, should go to the director of that school, P. O. Box P, Oak Ridge, Tenn.

NEA

'ROUND THE TABLE: Here's the National Security Council. From left to right: James S. Lay Jr., executive secretary of the council; W. Stuart Symington, chairman, National Security Resources Board; W. Averell Harriman, presidential adviser on foreign affairs; Lt. Gen. Walter Bedell Smith, director, Central Intelligence Agency; Gen. Omar N. Bradley, chairman of joint chiefs of staff; Secretary of Defense George C. Marshall; Secretary of State Dean Acheson; President Truman; Secretary of the Treasury John W. Snyder. Vice President Alben W. Barkley, who is also a member, is not present

Refinery Waste Moves Into the Big Time

Vast potential supply of LPG from oil and gas wells awaits expanded distribution system. More pressure tanks and equipment will store and ship it. Motor fuel use is pushed

By A. H. ALLEN
Associate Editor

ONCE little more than a nuisance in oil refinery operations, liquefied petroleum gas (abridged in the trade to LPG or LP-Gas) has in a quarter century burgeoned to a top-ranking industry, talking in terms of billions of gallons of output, millions of users and millions of dollars coming into the till. Thus, total sales last year bounced up 25.4 per cent from 1949 to 3333 million gallons, against a puny 404,000 back in 1925.

There were 7.5 million "bottled" gas installations on farms and suburban areas. Gas ranges built specifically for LPG last year numbered 713,000. Special kits for the conversion of farm tractor engines to LPG were supplied to the tune of over 100,000, equivalent to 22 per cent of total domestic shipments of wheel-type tractors.

Sales of gas to industry and for fueling internal combustion engines jumped 21 per cent to 300 million gallons. Utilities took 240 million gallons for gas manufacturing purposes as many an old "water gas" plant bit the dust. Chemical companies supplying alcohols, detergents, plastics, resins, glycols, acetates, antioxidants and special solvents soaked up 650 million gallons. Another 207 million gallons went into synthetic rubber.

But nearly two-thirds of all sales went to the domestic market, that is, farmers and suburban householders where the greatest concentration of retail sales effort has been directed.

Definition—What is LPG? Well, it is defined as simply a mixture of hydrocarbons that have been changed to liquids under pressure in order to transport, store and use efficiently. Originally, the gases were squeezed out of "wet" natural gas coming from wells and it is still an enormous potential reserve, steadily increasing. A second source is the light hydrocarbon gases developed in the cracking of crude oil.

Principal constituents of LPG are propane (C_3H_8) which changes from a liquid to a gas under normal pressure at —44 degrees fahrenheit, and butane (C_4H_{10}) which volatilizes at 31 degrees fahrenheit. Mixture is usually 50-50, although currently the trend is toward higher concentration of propane because its lower "boiling" point means it will be self-vaporizing at normal atmospheric temperatures over a wide range of climates. Propane has heating value of 2526 Btu per cubic foot, butane 3276 Btu, natural gas 1100 Btu and manufactured gas 560 Btu; thus the LPGs have high heat value per unit of volume. On a liquid volume basis, propane delivers 92,000 Btu per gallon, 27 per cent under gasoline's 118,000 Btu per gallon.

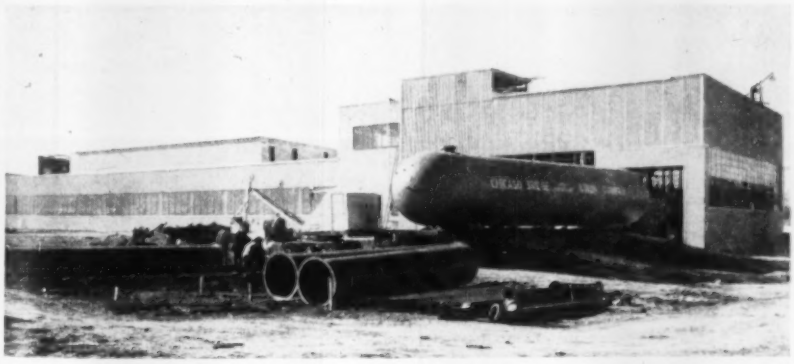
Phfew—LPG is of course heavier than air, nonpoisonous, colorless and odorless. As a safety precaution and under law it must be odorized. One technique is to add an aroma of "stale cabbage" or to include intermediate hydrocarbons propylene (C_3H_6) or butylene (C_4H_8), both good stinkers.

Big shots in the LPG industry are Phillips Petroleum Co. and Warren Petroleum Corp., although there are about 130 producers in all, of which some 50 might be classed as good-sized. With practically unlimited reserves they are turning their large-caliber marketing guns on new and expanded outlets, such as urban motor coach systems, and are talking confidently of a 50-100 per cent hike in consumption over the next decade. They would like to grab off 15 per cent of the juicy motor fuel market by 1960 and figure to have more than ample reserves to do it. One estimate is that LPG reserves now would sustain consumption of 21 billion gallons annually.

R. C. Alden, chairman of Phillips' research planning board, is really steamed up over LPG possibilities as direct motor fuel, declaring flatly that large-scale use "appears to be as inevitable as tomorrow's sunrise." He has some pretty substantial figures to show that by 1960 the total potential LPG in natural gas reserves and LRG (liquefied refinery gas) from crude oil reserves will almost equal motor fuel in reserves.

Under Pressure—It isn't reserves that worry the LPG people; it's the problem of distribution and the equipment to handle the job. The

From U.S. oil refineries and natural gas wells are annually squeezed billions of gallons of propane, butane and intermixtures, liquid under pressure but easily volatilized to clean, sweet and comparatively low-cost fuels.



FOR STORING liquid propane this 75-foot 30,000-gallon tank is being set up at the new 236,000 square foot refrigerator plant of Deepfreeze Appliance Division of Motor Products Corp., North Chicago, Ill. Fuel is piped to drying ovens which Austin Co., the builder, decided to place on the roof of the building

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fuel must be moved under pressure from producers' plants to bulk storage tanks, either above or below ground, requiring tank cars, tank barges or pipelines built to withstand up to 250 psi pressures. From bulk storage another transfer usually is made by tank truck to the ultimate user who also must have his own outside storage facilities, whether they be on a farm or at an industrial plant. All the transport and storage equipment is covered in detail by state regulations and codes and, as in all things of that nature, there is a degree of red tape and confusion. It is a far different story from dispensing natural gas or electricity from a central distributing station direct to the user.

Exclusive of Detail—Equipment, pipelines, fittings, valves, regulators, vaporizers and whatnot required to keep step with expanding use of LPG mean more steel and more copper, to name two vital materials now in short supply. A typical 30,000-gallon storage tank weighs better than 41 tons, being fabricated of medium carbon steel plate up to ⅞-inch thick, welded in accordance with ASME code U-68 specifications. Right now the Philadelphia Gas & Electric Co., recently tied into the natural gas line from the Panhandle, is setting up a 500-tank farm to store LPG for stand-by, peak load and enrichment purposes. There are 21,000 tons of steel in one whack, exclusive of such details as manifolding, valves, regulators, supporting structure and the like.

Another large utility installation is the Michigan Consolidated Gas Co.'s 96 tanks of 30,000-gallon capacity at Detroit, made over four years ago for standby service. And scattered throughout the country, particularly where natural gas is not available, are hundreds of other storage tanks operated by utilities, either to supplement present gas supply or to replace manufactured gas made by the old coke-and-steam process. A late check showed 439 cities and towns served by 288 utilities using LPG as a sole source of supply. Beyond that there are over 3700 bulk plant distributors of LPG, some with 30,000-gallon tanks, some with 18,000-gallon units weighing better than 25 tons, and some smaller.

On Second Thought—Extension of LPG use obviously means good business for the several hundred builders of steel tanks, or rather pressure vessels as they should more properly be called. An estimate of their steel requirements for 1951 has been made and submitted as a part of the National Petroleum Council's committee on steel requirements for the entire petroleum industry subsequently presented to NPA in Washington for study and action. The gross tonnage first envisaged for the oil industry was reported to have been 12 million tons, but this figure was tagged as entirely unrealistic, having been based largely on information from fabricators and probably containing considerable duplication. It was later revised to 8 million tons.

A CALIFORNIA inventor has dreamed up this snow melter, equipped with 33 propane-fired burners which reduce 125 cubic feet of snow to water in 2½ minutes

Sun Oil Co. Is Doing It—Some steel companies have suggested that tank builders switch to low-alloy high-tensile steel and save perhaps 25 per cent on storage requirements. Sun Oil Co. is understood to have done this in its new transport trucks, primarily with the idea of increasing payload by virtue of the higher strength steel and its resultant lower tare weight.

World's first propane ship, now in service between Houston and East Coast terminals, is the Warren Petroleum Corp.'s *Natalie O. Warren*, a 412-foot war-built freighter converted for carrying 1,386,000 gallons of LPG. She is equipped with 68 high-tensile steel tanks ranging from 8 to 13 feet in diameter and from 17½ to 50 feet in length, all of welded steel plate ranging from 1 to 1⅜ inches in thickness, welded, stress relieved and fully X-rayed so they are capable of handling pressures of 200 psi and better. Safety features include large pressure-relief valves connected to a header which discharges into one of the ship's hollow masts, thus venting escaping vapors 60 feet above deck. Discharge and gas pressure connections are protected with a new type of hydraulic internal valve which is always closed unless opened by operating a small hydraulic pump at each tank, the latter so arranged to be operated by centralized air control valves.

As for rail shipment of the LPG there are now an estimated 10,000 tank cars in service for this exclusive use, and 2500 more are on order. It is figured one tank car is required for the movement of each 150,000 gallons per year. Two major products pipelines are now transferring LPG in bulk lots, and as the trend toward higher pressures develops in the liquefaction of natural gas for pipeline shipment there will be more LPG included in such lines.

Salted Away—In the matter of storage facilities, an interesting stunt was worked in Texas not too long ago, when an old salt mine was washed out and 1500 barrels of liquid propane pumped into the subterranean cavity. A check showed 99 per cent recovery and a storage cost of $2.50 a barrel against an estimated $15 a barrel for steel pressure vessel storage.

It is no secret that costs of storage and distribution of liquefied gas are high, and going higher, far more so than may be the case with oil, gasoline or natural gas, where the problem of pressures is not so important. Beyond that must be considered the shackling effects of widespread state and local codes and regulations. Pressure vessels must be welded strictly in accordance with code provisions. They must be inspected regularly and certified every five years. "Filling densities" (per cent ratio of the weight of the gas in a container to the weight of water the container will hold at 60°F) are carefully spelled out, and must be adhered to rigidly in the interests of safety. Then there are local situations like that at Cleveland where an explosion of a liquid natural gas spherical storage tank, with serious loss of life and property, was followed by a city ordinance preventing erection of any new storage facilities including those for LPG.

Pamphlet 58: A Bible—Valves, regulators, filters and other equipment are subject to maladjustment, fouling up from nonvolatile contaminants originating in LPG processing plants, and to leaks. They must be checked regularly, not only as safety precaution but also because leaks are very costly when handling fuel under pressure. The pattern for many state safety regulations covering liquefied gas, and a so-called "bible" on the subject in general, is Pamphlet 58 compiled by the Liquefied Petroleum Gas Association, Chicago, an organization of better than 1000 companies in the field of petroleum products production and distribution, along

with a number of equipment builders.

While new uses are expanding, with publicity stories telling how a crematory in Orlando, Fla., has converted to LPG, how steel companies are setting up supply facilities for fueling cutting torches in scrap yards, etc., the big juicy plum which producers are drooling over is direct motor fuel. After all, here is a fuel with a research octane rating of 112 (propane), against 79-90 for present gasolines, which offers the attractive possibilities of up to 2 cents a mile saving in cost, lower manifold temperatures and improved fuel distribution to cylinders, greatly extended engine life between overhauls, double or triple the service life of engine oil because of no dilution, sludge, grime or carbon.

What's Cooking—Small wonder the oil company boys are cooking up plans to capture 15 per cent of the motor fuel market in the next ten years, so they can unload 9 billion gallons annually to this lush market.

Against the undisputed advantages of LPG in automotive engines must be weighed adverse factors such as heavier fuel tanks, liquid filters and solenoid shutoffs, high-pressure and low-pressure regulators, vaporizer-heat exchanger units, cylinder heads for 10:1 compression ratio, special cold starting provisions, pressure-tight fuel lines and fittings. A typical LPG fuel tank installation for a bus weighs 480 pounds, against 70 pounds for a gasoline tank. The weight disparity, of course, is offset by the lower density of propane, but the size of the heavier tank is considerably larger, since a 100-gallon fuel tank must have water capacity of 133 gallons. Regulators are required to step down the 175-pound vapor pressure of the propane to the ¼-inch vacuum for admission to the carburetor. The latter, with LPG, becomes merely an air-gas proportioning valve, air-gas ratio being around 14:1.

There are in use two methods of drawing off fuel from the pressure tank—either as liquid or as gas, the latter being possible since the fuel tank is never completely filled. With gas withdrawal, the engine feed equipment becomes somewhat more simplified, no vaporizer and heat exchanger being required. However, it is usually necessary to have auxiliary fuel metering system in an LPG installation to insure cold weather starting.

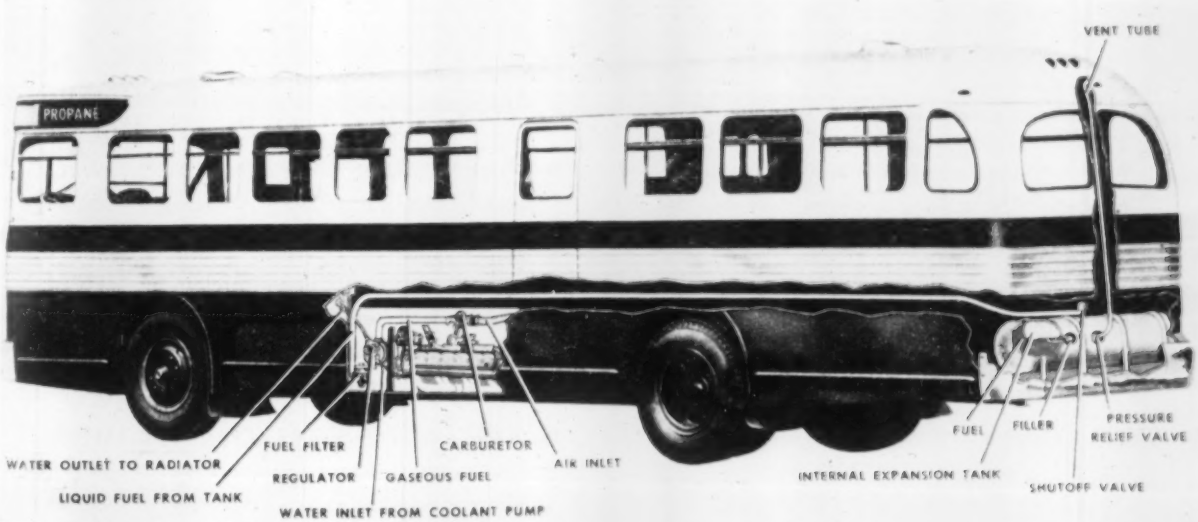
Fleet of Propane Busses—There is nothing new about propane-powered bus engines. Lou Fageol of Twin Coach Co., Kent, O., was working with them as far back as 1930, and a large fleet was operated in Seattle in 1935. Last year the city of Chicago ordered 500 busses from Twin Coach, a few of which have been delivered. A five-year contract has been placed for 20 million gallons of propane for fueling the vehicles, the plan being to have two or possibly three storage and dispensing yards conveniently located to operating routes.

These busses have engines developed specifically for propane fuel. The design, originated by Fageol about six years ago, has compression ratio of 10:1. Twin Coach also supplies conversion kits permitting regular gasoline engines on busses to be switched over to LPG. They are priced at $400-$800, and include fuel tank, filter, shutoff (if desired), regulators and vaporizer built into a single unit, a new cylinder head and air-gas mixer or carburetor. About 100 of these kits have been sold thus far.

In the Taxis—A number of other cities have purchased LPG-powered busses, either for regular operation or for test purposes. Some truck installations have been made, one report being that their use in the Mesabi iron range proved a 20-30 per cent saving in maintenance costs. A few taxicab fleets have been refitted for propane power and operation has been successful, except that the bulky fuel tanks have pre-empted baggage space. For passenger cars, no immediate or even future possibilities are seen, primarily because of the complicated equipment and fuel distribution problems. An attempt was made some years ago in California in this direction, but it flopped.

Reflecting the general interest in LPG as direct motor fuel, three technical papers were programmed at the recent annual meeting of the Society of Automotive Engineers in Detroit, covering LP-gas for motor fuel; engine and carburetion equipment requirements, and comparative operating data of tractors using gasoline or LPG.

Industrial uses of LPG cover a wide range, but are for the most part of a stand-by or gas enrichment nature. Core baking ovens, drying ovens, heating furnaces, heat treating furnaces, annealing furnaces and the like all can be easily adapted to LPG, but where plant has easy access to low-cost natural gas, the economics of the two favor natural gas.



CUTAWAY view shows components of propane fuel system for motor coaches being built for Chicago. This liquid withdrawal system is designed to handle pressures up to 200 psi. The tank alone weighs about 480 pounds, against 70 pounds for the same size gasoline tank, but the weight is offset somewhat by lower density of fuel

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Now, more than ever before, America must make full use of its steel-making capacity and conserve its natural resources. Now, more than ever, there is national significance in the phrases, "*Make a ton of sheet steel go farther*" and "*Make your product last longer.*"

These low-alloy, high-tensile steels do "make a ton of sheet steel go farther"—for their inherently higher strength is 50% greater than mild carbon steel. That means, in turn, that 25% less section can be used with safety, and where rigidity is important, this can usually be compensated for through slight design change.

"Make your product last longer" is no idle claim. The much greater resistance of N-A-X HIGH-TENSILE to corrosion, abrasion, and fatigue assures longer lasting products even at reduced thickness.

Explore the potential economies to be derived from the use of low-alloy, high-strength steels—and then specify them. Their use can add materially to our national conservation program.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division, Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

By H. C. TUTTLE *Detroit Editor, STEEL*

Mirrors of Motordom

Automakers hunt for materials substitutes as restriction orders increase. Paint will sub for much stainless, but there's a growing shortage of even that material

DETROIT

THAT old chestnut "history repeats itself" is on the tip of the auto industry's tongue.

Nine years ago in January the industry began producing what it called its 1942-B models. Paint and lacquer were substituted for chrome. Aluminum pistons gave way to iron. Nickel plating was reduced in thickness or eliminated altogether. Instead of zinc die castings, steel stampings, antimonial lead castings or plastics were used. Plans were being made to fabricate radiators out of steel.

Repeat Performance?—Beyond this point, the industry hopes, the similarity ends, because in February, 1942, manufacture of civilian automobiles was suspended. There is no indication in February, 1951, that the end of automobile manufacture is near. But the period of substitutions is fast approaching.

The Jan. 23 amendment to NPA Order M-4 prohibiting use of nickel in plating a myriad of automobile parts and accessories after Mar. 1 and nickel-bearing stainless after Apr. 1 will result in a partial "brownout" on the cars produced after those dates.

Glitter Without Gold—How devoid of glitter these cars will be has not yet been decided by the automotive men. The substitution specialists have some fancy tricks up their sleeves. Few of these, however, have crystallized enough so that a feature-by-feature comparison of the post-deadline cars with today's gleamers can be made.

The industry is counting its blessings that it can continue to use nickel plating on the bumpers, door handles, hub caps and window channels. Bumpers would have been far and away the toughest item to find satisfactory substitute finishes for. By allowing these to be nickel plated, NPA gave the industry its most hoped-for concession.

New Uses for Paint—Paint will be used in a good many places which are now chrome. Grilles particularly will get this treatment. Likelihood is that high gloss aluminum paint will be used by many of the makers. Lustrousness of some of the newly developed aluminum paints is satisfactory and already has been used to good advantage in some of the 1951 cars.

But to get a sufficient quantity of such paint will be a problem. One solution will be the discontinuance of use of so-called metallic body finishes. These disappeared in early 1942 and will again.

Lucky—Fortunate are those manufacturers who have been using straight chrome stainless steels for their moldings and rub rails. The latest order does not limit use of those. But nonavailability will prevent any wider use of straight chrome and will prevent any car makers who do not now trim their cars with stainless from switching to it. For trim which requires extensive forming operations, the nickel-bearing stainless steels have been used but will be taboo after Apr. 1.

In some of these applications the possibility of plastic substitutes is being toyed with, but it is no easy job in auto makers' or suppliers' plants to switch from one material to another. Painted carbon steel will probably be used in preference.

Similar Face—There are a number of car makes with grilles of zinc die castings, chrome plated. Substitution of polished pure zinc plating for the chrome and sealing the surface probably can keep the front of these cars looking about the same. Cars which had parts finished that way in 1942 looked creditable years later. The material is becoming less critical; government buying has stopped. But if carmakers rush to get more, that could put it back on the short list and result in more stringent regulations than now apply.

There is nothing definite on this yet, but a distinct possibility in some applications is silver plating. The car makers may use it in limited areas where no particular wear is encountered, such as escutcheons. No one wants to be outshone on their 1951 cars.

Death Knell?—The hardest jolt handed out by NPA with its nickel order is not to the car makers nor to the car-buying public. It is the platers who will suffer—nickel specialists, particularly—and the Detroit area abounds with them.

The order sounds like a death-knell to them, since very few have defense work and such requirements in volume are many months away. They are appealing to Washington for relief from the stringent terms of the order. This kind of appeal on the part of a group of predominately small businessmen, worked to some degree on the aluminum orders when a listing of nonessential aluminum uses would have put the quietus on many of them.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	650,545*	609,878
February		505,593
March		610,680
April		585,705
May		732,161
June		897,853
July		746,801
August		842,335
September		760,838
October		795,947
November		633,678
December		671,284

Weekly Estimates

Week Ended	1951	1950
Jan. 6	99,955	116,768
Jan. 13	139,679	154,552
Jan. 20	162,485	158,432
Jan. 27	165,426	141,036
Feb. 3	166,000	127,428

Estimates by Ward's Automotive Reports

* Preliminary.

Olds Models Take Bow

A completely new body on the Oldsmobile "88" came a cropper before it could be introduced, because of the price freeze. As 1951 models for the "88" and "98" appeared in showrooms last week, the restyled "98" took the spotlight — with trim in stainless.

Spear-like molding now extends the length of the car from a few inches back of the headlight to a point just above the blunt-nosed gravel shield where it arches over the fender embossing and continues on a straight line to just short of the tail light.

What formerly was open work covered with horizontal louvers under the headlights has been closed in, redesigned vertical decoration louvers being used. Air scoops for the heater

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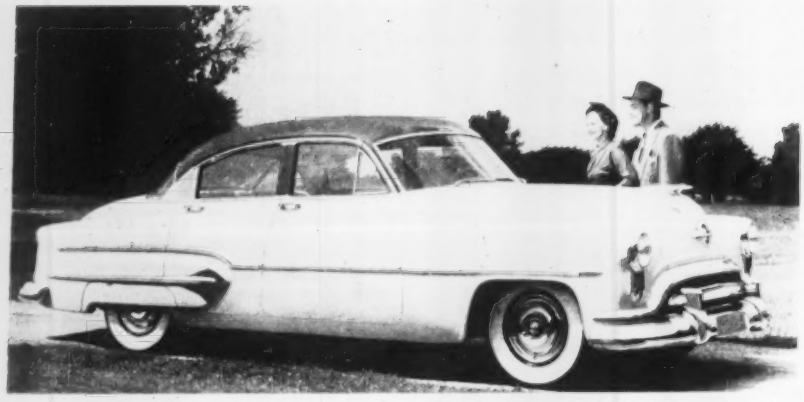

HOLIDAY FOR '51: Stainless steel and chromium-plated styling features the 1951 Oldsmobile series 98 Holiday sedan. The stainless spear-like trim on the rear fender also serves as a gravel shield. Ribbed chromium is placed where rear roof and window meet the rear door window. Leaf-type springs in the rear for greater riding comfort, a 122-inch wheelbase and a Rocket engine with compression ratio upped to 7.5 to 1 are other features

which these formerly concealed are now alongside the radiator.

Compression ratio of the 135-hp engine which powers both series has been raised from 7.25 to 1 to 7.5 to 1. The compression chamber in the cylinder head has been changed, shortening the flame travel and providing a more effective "quench area" above the pistons. This change, Oldsmobile engineers report, will help the Rocket engine capitalize on its high compression advantages even though gasoline octane numbers are reduced.

Greater fuel economy should result from a change in carburetor design on the new models. Of downdraft type with vertical air inlet, the advantages claimed are faster cold weather starting and minimization of flooding.

The engine's distributor is of new design, cap being enlarged to provide more voltage by reducing arcing. A lighter high-speed breaker arm and improved resistor rotor are incorporated. In order to keep out moisture silicon rubber insulating sleeves cover the porcelain areas of the spark plugs and the connections of the lead-in wires. A new hot-operating muffler has also been installed to minimize condensation. The starter has been sealed against moisture.

Inside the "98" leg room has been increased by 2½ inches in the rear seat by moving back the seat and recessing the back of the front seat. Wheelbase on the "98" continues at 122 inches although overall length has been reduced 1 inch to 208 inches. No change in dimensions are made in the "88".

Frame has been redesigned in the "98", I-beam construction in the x-cross members replacing less rigid channels. The complete frame is cold-riveted and arc-welded at intermediate points and at the side rails. In the "98" series leaf springs replace coil springs in the rear. These tapered semi-elliptical springs are 58 inches long, 2½ inches wide.

Bigger Hard-Top Sales Seen

Sales limits of the hard-top convertible as a body type have not yet been reached. The distinctive styling is not yet available from all manufacturers, partly because the price, just below that of convertibles, prevents universal acceptance. Nevertheless, design is here, and in quantity. General Motors produced 211,223 units of this type last year.

Ford brought out its "Victoria" putting the design into limited production last week. Sporting five single colors and five two-tone combinations with three interior color choices, the hard-top features the absence of door posts and capitalizes on use of glass—3000 square inches of it. No decision has yet been made at Ford as to the fate of the Crestliner, which was a stop-gap until the hard-top could be engineered. Listing at about $200 less, it may take some play away from the new style.

Final 1950 Output Tallied

Final tally by the Automobile Manufacturers Association of auto and truck production in the United States and Canada for 1950 racks up the total of 8,392,753 vehicles—6,950,010 passenger cars, 1,437,472 trucks and 5,271 busses. Produced in the United States alone were 6,665,628 cars, 1,332,247 trucks, and 4907 busses. A total of 8,002,782 units.

Defense Orders Pour in

After months of hearing talk about defense orders but lacking contracts itself, the automotive industry is now starting to have trouble remembering how many it has received. New orders have been coming out of the Navy, Air Force and Ordnance departments to the automakers in an ever increasing crescendo. Some are:

Ford—$40 million order to manufacture tank engines and spare parts. Those will be produced by the recently formed engine and foundry division in a building which houses a magnesium smelter in the last war. A complete tooling job is required.

Ford—$31 million total from three contracts for administrative vehicles and trucks. All 15 of the Ford division's assembly plants will make the commercial-type vehicles for the Ordnance tank-automotive center.

Buick—$65 million prime contract for tank transmissions of the torque converter type. Weight of the transmission is 3000 pounds. Tooling for this job will get under way at once. All forging, machining and assembly will be at Buick's Flint, Mich., plant. Part of the work will be done in the new 170,000 sq ft addition now being built onto the foundry. The units will be assembled in the factory now housing car shipping operations. Between 5000 and 6000 workers will be employed on this contract.

Hudson—undisclosed amount for Wright R3350 reciprocating aircraft engines from the Navy. This engine is used in Douglas AD-4 sky-raiders, in Lockheed P2V Neptunes, and in Martin P5M Marlins. In addition it may be furnished to the Air Force for use in Fairchild C-119 packets. The engines will be produced in the Detroit area at an undisclosed plant, possibly yet to be built. Much of the machine tooling needed will be furnished from government reserves.

Aeroproducts Division of General Motors at Dayton—it will furnish an undisclosed number of propellers. This is understood to be one of the largest, if not the largest, order for propellers yet made.

On the verge of being let to Packard Motor Car Co. is a contract for General Electric J-47 turbo-jet engines. This is the engine which powers the swept-back wing B-47 several other bombers and fighters.

Three orders were placed with bus builders by the Ordnance Tank-Automotive Center at midweek. Twin Coach at Kent, O., received contract for $19.5 million; General Motors Truck and Coach Division, Pontiac, Mich., $11.5 million; and ACF Brill, Philadelphia, $5.5 million.

The Business Trend

Two-fold job (civilian and defense) keeps industry moving at fast pace. Production index is now well ahead of what it was a year ago

TRYING to do two jobs at once is making industry run at a fast pace. It's attempting (and so far succeeding pretty well) to keep civilian goods production at a high level, and it's moving into its defense assignments with increasing momentum.

Reflecting its success in its twofold task is the high level of STEEL's industrial production index. In the week ended Jan. 27 it was at 220 per cent of the 1936-1939 average, only 2 points below the postwar high set last October. The latest level is 3 points above that of the preceding week. That marked the third consecutive week of recovery from the yearend letdown. A year ago the index was only 192, and two years ago it was only 184.

Some of the civilian production undoubtedly will be choked off by effects of government controls on materials. How much this stifling can be minimized depends to a great degree on how fast productive capacities can be expanded or how successful industry is in finding substitutes for hard-to-get materials.

Steel Still Breaks Records . . .

One industry conspicuous in expanding capacity is steelmaking. Almost every week continues to bring forth announcements of expansions or of establishment of new steelmaking companies. The condition that spawns this growth is spurring the industry to push its ingot making facilities for all the output possible. In the week ended Feb. 3 the steel industry was expected to set another new production record by turning out 2,025,000 net tons of steel for ingots and castings. Each of the last four weeks has seen a new steel production record.

Workweeks Are Longer . . .

Not only are expansions of capacity helping meet the needs of a "butter and guns" economy. Long workweeks for the nation's 13 million factory production workers are aiding too. By mid-December their workweek was up to an average of 41.6 hours, an increase of almost two hours over the year, says the U. S. Labor Department. Also up were their average weekly earnings. In December they were $64.15, an $8 gain over the year. This rise results from both the lengthening of the workweek and widespread advances in wage rates. Gross hourly earnings reached an average of $1.54, a 13-cent gain for the year.

Auto Output Speeds Up . . .

Also contributing to the high level of industrial activity is automaking. Although the auto producers have been taking on defense jobs here and there, they have been able to step up their auto output in each of the last three weeks. In the week ended Jan. 27, the production of passenger cars and trucks in the U. S. and Canada climbed to 165,426 units from 162,485 in the preceding week, says *Ward's Automotive Reports*. In the week ended Jan. 28, 1950, the output was only 141,036.

January's total output exceeded

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	100.0	99.5	98.0	94.0
	Electric Power Distributed (million kilowatt hours)	6,970	6,909	6,479	5,972
	Bituminous Coal Production (daily av.—1000 tons)	1,863	1,977	1,837	1,210
	Petroleum Production (daily av.—1000 bbl)	6,050	6,051	5,768	4,956
	Construction Volume (ENR—Unit $1,000,000)	$305.3	$391.6	$111.2	$216.4
	Automobile and Truck Output (Ward's—number units)	165,426	162,485	135,229	141,036
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,264; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	780†	780	602	636
	Business Failures (Dun & Bradstreet, number)	193	167	125	232
	Money in Circulation (in millions of dollars)‡	$27,028	$27,200	$27,916	$26,913
	Department Store Sales (changes from like wk. a yr. ago.)‡	+31%	+31%	+18%	0%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$16,880	$16,938	$14,486	$13,555
	Federal Gross Debt (billions)	$256.0	$256.0	$256.7	$256.8
	Bond Volume, NYSE (millions)	$27.1	$30.9	$22.8	$21.6
	Stocks Sales, NYSE (thousands of shares)	12,779	18,248	14,128	7,435
	Loans and Investments (billions)†	$70.4	$70.8	$71.4	$67.7
	United States Gov't. Obligations Held (millions)†‡	$32,634	$33,046	$33,854	$38,131
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	171.92	171.92	167.89	156.13
	STEEL's Nonferrous Metal Price Index‡	261.0	258.5	246.9	159.9
	All Commodities†	179.9	178.7	176.0	151.3
	Metals and Metal Products†	188.4	188.3	184.1	168.5
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

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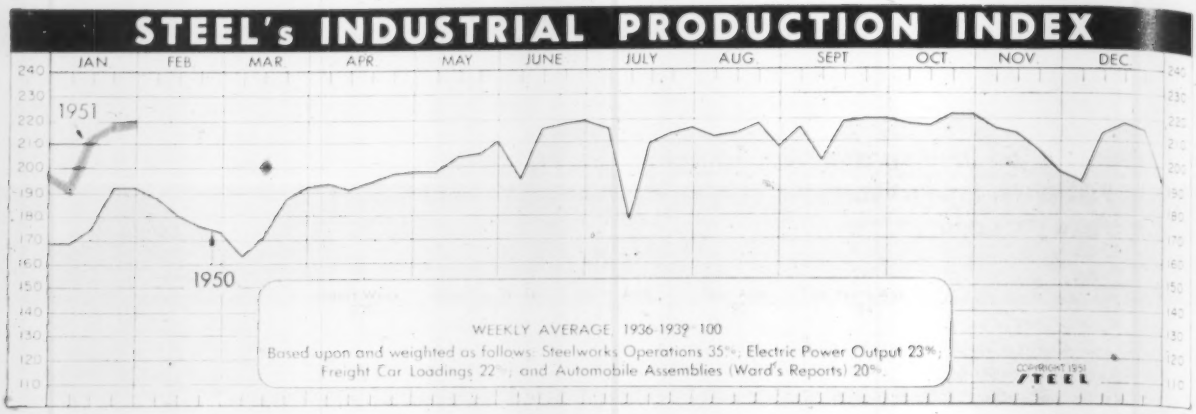


Week Ended Jan. 27

that of both November and December. Prospects for February are that production will be unusually strong, despite the fact it has the shortest number of working days of any month of the year.

More Plants for Industry . . .

Heavy industrial building awards continue to push engineering contracts strongly above year-ago levels. In the week ended Jan. 25, the total of contracts was $305 million, a 41 per cent increase over its 1950 counterpart, says *Engineering News-Record*. The cumulative total for this year is 38 per cent above that for the corresponding period of 1950.

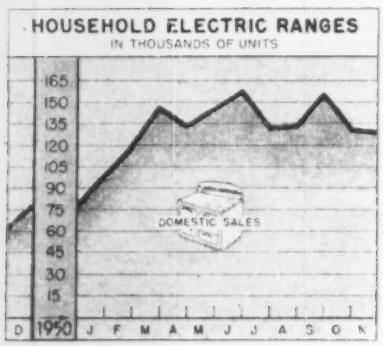
Coal Production Up . . .

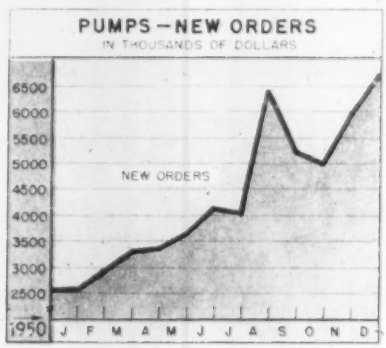
Output of bituminous coal declined slightly in the week ended Jan. 20, but the aggregate production in the first three weeks of this year is 65 per cent above that for the corresponding period of 1950. Production Jan. 1 through Jan. 20, 1951, was approximately 33,065,000 net tons; in the like period of 1950 it was 20,330,000 tons.

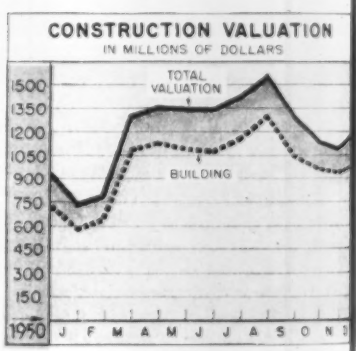
Bituminous coal output in the week ended Jan. 20 was estimated by the National Coal Association at 11,180,000 tons, compared with 11,860,000 in the preceding week.

Persistent to the Last . . .

Setting of new weekly records by the government's wholesale price index continued right up to the eve of the government's price freeze. In the week ended Jan. 23, the index touched the new alltime high of 179.9 per cent of the 1926 average. That was 2.2 per cent above four weeks ago, 14.7 per cent above the May 24-June 24 average, and 18.9 per cent above a year ago. All major commodity







Household Electric Ranges

	1950	1949	1948
Jan.	97,925	106,473	103,585
Feb.	118,989	87,370	103,506
Mar.	145,417	87,543	127,461
Apr.	132,859	59,894	104,677
May	145,498	52,286	98,983
June	158,534	68,107	123,300
July	136,505	62,402	83,485
Aug.	132,243	66,222	116,107
Sept.	156,216	91,073	128,829
Oct.	130,452	72,672	122,516
Nov.	128,363	60,523	123,661
Dec.	.....	77,011	105,387
Total	.....	903,806	1,341,497

National Electrical Mfrs. Assoc.

Pumps, New Orders

In Thousands of Dollars

	1950	1949	1948
Jan.	2,586	3,390	3,819
Feb.	2,938	3,247	3,635
Mar.	3,313	3,593	4,703
Apr.	3,376	2,699	4,312
May	3,668	2,775	3,724
June	4,153	3,019	3,512
July	4,080	3,358	4,075
Aug.	6,429	3,767	4,520
Sept.	5,191	2,914	3,471
Oct.	4,985	2,539	3,571
Nov.	5,961	5,525	3,580
Dec.	6,720	2,560	4,263
Total	53,400	36,386	47,188

Hydraulic Institute

Construction Valuation

(37 States)—In Millions of Dollars

	Total		Building	
	1950	1949	1950	1949
Jan.	730.9	483.0	578.8	381.9
Feb.	779.5	568.5	627.0	415.9
Mar.	1,300.2	747.6	1,075.3	579.2
Apr.	1,350.5	842.6	1,123.5	620.2
May	1,347.6	880.3	1,083.0	666.9
June	1,345.5	945.7	1,072.0	706.7
July	1,420.2	943.6	1,162.2	690.9
Aug.	1,548.9	906.7	1,295.1	671.3
Sept.	1,286.5	1,093.7	1,048.3	870.9
Oct.	1,135.8	1,061.8	956.7	857.2
Nov.	1,087.1	957.8	931.6	701.3
Dec.	1,168.4	929.0	969.0	722.2
Total	14,501.1	10,359.3	11,922.5	7,883.2

F. W. Dodge Corp.

Charts—Copyright 1951, STEEL

groups, except chemicals, showed increases.

Consumers Squeezed Again . . .

Even before the new alltime high records set by prices in January the government's consumers' price index rose to a new high in the month between Nov. 15 and Dec. 15. The index for that period was 178.4 per cent of the 1935-1939 average.

Needed: Shrinkproof Dollar . . .

The continued climb in prices meant the dollar's value was shrinking. Measured by consumers' prices, the purchasing power of the dollar declined in December to 55.9 cents (see accompanying chart and table). That was a 1-cent drop from the preceding month. Measured by wholesale prices, the dollar's purchasing power contracted in December to 45.9 cents.

Store Sales Zoom . . .

Consumers' efforts to hedge against rising prices and growing scarcities of goods kept department store sales at a high level in the week ended Jan. 20. Dollar volume of sales that week was 31 per cent over that of the like week last year, the Federal Reserve Board reports. Volume in the week ended Jan. 13 also had been 31 per cent higher than in its 1950 counterpart.

Boom for Laundry Equipment . . .

High level of appliance production in 1950 is reflected by figures released by the American Home Laundry Manufacturers' Association.

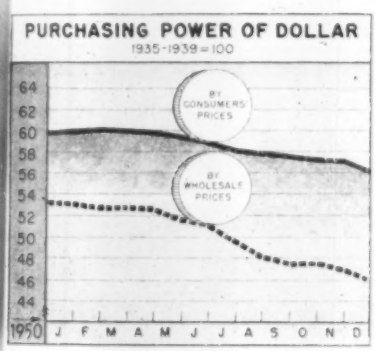
Factory sales of standard-size household washers during the year totaled 4,289,931 units, a 41.4 per cent increase over the 3,033,106 units in 1949.

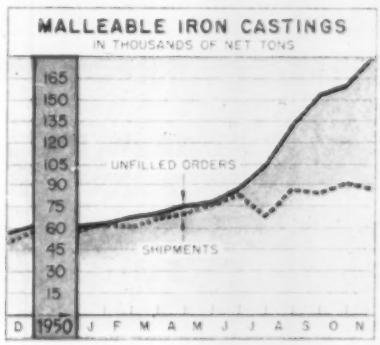
Sales of dryers showed the phenomenal increase of 201.2 per cent over 1949. Sold in 1950 were 318,488 units, compared with 105,727 in 1949.

Also up were sales of ironers. The 409,200 sold in 1950 represented a 33.1 per cent gain over the 307,345 sold in 1949.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Durable Goods	Nov.27	Gray Iron Castings	Jan.8	Refrigerators	Jan.15
Employ., Steel	Jan.29	Indus. Produc.	Jan.15	Steel Castings	Jan.29
Fab. Structural Steel	Jan.8	Ironers	Jan.15	Steel Forgings	Jan.29
Foundry Equip.	Jan.29	Machine Tools	Jan.22	Steel Shipments	Dec.25
Freight Cars	Jan.22	Metalwkg. Employ.	Jan.8	Vacuum Cleaners	Jan.15
Furnaces, Indus.	Jan.22	Price Indexes	Jan.22	Wages, Metalwkg.	Jan.29
Furnaces, W. Air	Jan.22	Radio, TV	Aug.14	Washers	Jan.15
Gear Sales	Jan.8	Ranges, Gas	Dec.4	Water Heaters	Dec.25





Purchasing Power of the Dollar

As Measured by:

	Wholesale Prices		Consumers' Prices	
	1950	1949	1950	1949
Jan.	53.1	50.1	59.9	58.5
Feb.	52.7	50.9	60.1	59.2
Mar.	52.7	50.8	59.9	58.0
Apr.	52.6	51.2	59.8	58.9
May	51.6	51.6	58.3	59.1
June	51.2	52.0	58.8	59.0
July	49.4	52.4	58.0	59.3
Aug.	48.3	52.6	57.8	59.2
Sept.	47.5	52.4	57.5	59.0
Oct.	47.6	52.8	57.2	59.3
Nov.	46.9	53.2	56.9	59.3
Dec.	45.9	53.2	55.9	59.7

U. S. Office of Business Economics

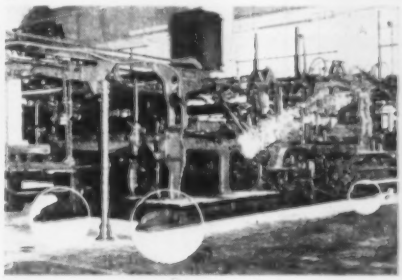
Malleable Iron Castings

Thousands of Net Tons

	Shipments		Unfilled Orders*	
	1950	1949	1950	1949
Jan.	62.9	71.9	62	126
Feb.	60.4	66.7	67	118
Mar.	66.3	72.1	70	102
Apr.	69.8	61.3	76	95
May	76.2	54.6	77	79
June	82.3	59.6	87	70
July	67.5	44.4	105	71
Aug.	86.0	58.1	132	61
Sept.	82.5	60.5	153	58
Oct.	90.0	57.2	160	54
Nov.	85.2	49.4	180	56
Dec.		57.4		61
Total		713.1		

* For Sale. U. S. Bureau of the Census

When You Anchor Machinery



Mount It On

UNISORB

for these

3 Big Reasons

1. UNISORB is equally effective on any type of flooring and with practically every kind of machinery. It requires no bolts nor lag screws nor floor drilling. A special cement binds the UNISORB pads to the machine feet and the floor with a *minimum* holding strength of 1500 lbs. per square foot.

2. UNISORB absorbs from 60% to 85% of transmitted noise and vibration. This reduces your costs for machine repair and replacements, as well as for floor and building maintenance and repairs.

3. By absorbing a large amount of the transmitted noise, UNISORB provides quieter surroundings for your employees, helps them work better, surer.

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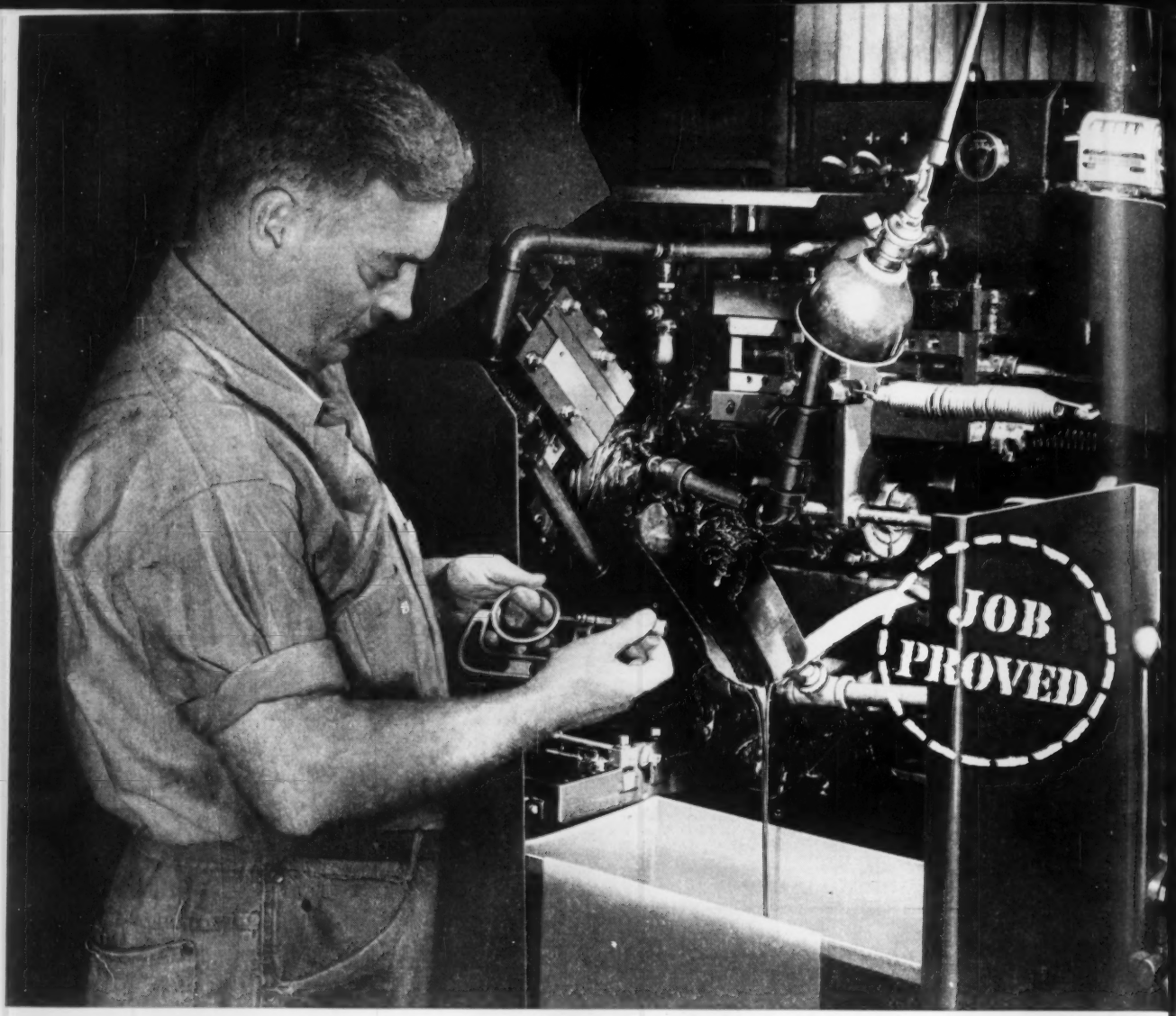

ONE OIL DOES WORK OF TWO

Dual-Purpose Sunicut Replaces Two Former Oils; Dilution Ends; Finishes Improve; Tool Life Lengthens

When one oil does work formerly requiring two . . . and with marked superiority . . . it doesn't make good sense to keep on buying two.

That is precisely why a prominent ball bearing manufacturer changed to Sunicut. He had been using one oil for lubricating his automatics, and another for cutting, but without complete satisfaction. The lube oil kept diluting the cutting oil by leaking into it. As a result, he got poor finishes and tool life was short. A Sun representative, called in to study the situation, advised using a dual-purpose grade of Sunicut. Adoption of his recommendation solved the problem.

For three years now, Sunicut has been used by the entire automatic department with complete satisfaction. A year ago a switch was made to the *new* Sunicut with Petrofac, Sun's revolutionary all petroleum additive, and even better performance has resulted.

The new Sunicut grades, transparent and non-emulsifying, have been thoroughly "Job Proved." Excellent results are being obtained on automatics machining all types of steel and brass at all practical feeds and speeds. For further information, call or write your nearest Sun Office.

SUN OIL COMPANY · *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
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SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO®

Men of Industry

R. BRUCE VASEY
. . . joins David Round & Son

E. C. IVERSON
. . . chief engineer, Towmotor Corp.

DEAN HAMMOND
. . . V. P.-engineering, Kaiser-Frazer

R. Bruce Vasey, advertising and sales promotion manager, Cleveland Chain & Mfg. Co., and its associates, joined **David Round & Son,** Cleveland, in the same capacity.

King & Kringel Machinery Corp., Denver dealer for Hyster Co., appointed **J. M. East** as vice president and general manager. He was with Independent Pneumatic Tool Co.

Paul Abel was elected vice president in charge of engineering for **Yoder Co.,** Cleveland.

Walter Bugenhagen was elected executive vice president, a new position, for **Aluminum Goods Mfg. Co.,** Manitowoc, Wis. He was vice president-sales. **Earl O. Vits,** vice president, and **Henry Vits,** purchasing agent, have retired.

M. A. Newton was appointed treasurer, **Pressed Steel Car Co.,** Chicago. **C. D. Norm,** assistant treasurer, was appointed controller.

Link-Belt Co., Chicago, appointed **C. W. Beauchamp** assistant sales manager, Ewart plant, Indianapolis, for both silent and roller chain; and **H. Merrill Bowman,** assistant sales manager for general products.

George R. Wernisch, manager, steel joist and roof deck division, Ceco Steel Products Corp., Chicago, was elected chairman of the **Metal Roof Deck Technical Institute.** Other officers named were **E. Klein,** U. S. Gypsum Co., vice chairman; and **E. A. Miller,** Detroit Steel Products Co., secretary-treasurer.

Towmotor Corp., Cleveland, appointed **E. C. Iverson** chief engineer. He was in charge of product design and development, J. D. Adams Mfg. Co.

Domenic A. DiTirro was named to head up sales and technical service engineering divisions of **Ross Operating Valve Co.,** Detroit. He was chief research and development engineer, Parker Appliance Co.

A. I. Stayman was appointed assistant to the general manager of sales, **Pittsburgh Screw & Bolt Corp.,** Pittsburgh.

Cyril J. Binne was appointed works manager, **Morris Machine Tool Co.,** Cincinnati.

Robert Krogh has been placed in charge of sales, Cincinnati area, **Ipsen Industries Inc.,** Rockford, Ill.

K. B. Winstead was promoted to general manager of sales, **Oil Well Supply Co.,** Dallas, subsidiary, U. S. Steel Corp., to succeed **M. F. Hazel,** appointed director of engineering. **Alex Quayle** is chief engineer in charge of all product design.

L. G. Graper, superintendent of steel production, Wisconsin Steel Works, a division of International Harvester Co., was appointed technical adviser for **Lone Star Steel Co.,** Dallas.

K. C. Gardner Jr., vice president of operations at **United Engineering & Foundry Co.,** Pittsburgh, was elected a member of the board of directors and of the executive committee. **C. W. Correll** is assistant treasurer.

Dean Hammond was appointed vice president-engineering, **Kaiser-Frazer Corp.,** Willow Run, Mich. He will direct engineering for the company's aircraft defense contracts as well as automotive development. **S. W. Taylor** was appointed to the newly created post of executive engineer.

Henry T. Blake was appointed assistant comptroller, **National Tube Co.,** subsidiary, U. S. Steel Corp., Pittsburgh.

Paul A. Duke was named product engineer, **Atlantic Steel Co.,** Atlanta.

Automatic Transportation Co. appointed **J. M. Johnson** sales manager of its Automatic Division, Chicago.

Robert R. Anderson was elected vice president, **Worthington Pump & Machinery Corp.,** Harrison, N. J., in addition to general manager of its new division, Worthington-Gamon Meter Co., Newark, N. J., formerly a subsidiary. **W. C. Flanders** was made assistant general manager of the division. **Walter H. Zeis,** formerly secretary-treasurer of the meter company, was elected assistant secretary of the Worthington corporation. **W. A. Finn** was named general European manager and **Robert T. Haslam** was elected a director.

Leon C. Guest was appointed controller, radio and television division, **Sylvania Electric Products Inc.,** Buffalo.

Walter S. Peper was appointed sales representative, New York area, **Lewis-Shepard Products Inc.,** Watertown, Mass. **Dave G. Richmond** will be in charge of sales in the Brooklyn and

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Jersey City areas. **Ross McIver** will handle sales for the same Newark-New Jersey area as hitherto.

David A. Challis Jr. was appointed assistant general manager of sales,

DAVID A. CHALLIS JR.
. . . asst. gen. mgr. sales, U. S. Steel Co.

United States Steel Co., Pittsburgh. **A. T. Gilbert** was appointed assistant chief engineer, South Chicago plant, to succeed **H. S. Spitz**, transferred to Pittsburgh.

Herbert L. Mausk was elected vice president-sales, and **Ellsworth H. Sherwood**, assistant vice president-sales for the railway division of **National Malleable & Steel Castings Co.**, Cleveland.

A. L. Geisinger was appointed a vice president of **Diamond Alkali Co.**, Cleveland, in charge of organic chemistry.

E. H. Gumbart was appointed Chicago district manager, **Bethlehem Steel Co.**, to succeed the late **J. F. Hennessy**. Mr. Gumbart is succeeded in Cincinnati as sales manager by **O. W. Buenting**.

Bernard W. Poland was appointed field representative, **Physicists Research Co.**, Ann Arbor, Mich.

Harbison-Walker Refractories Co., Pittsburgh, appointed **Robert J. Wagner** industrial relations manager.

Cannon Electric Development Co., Los Angeles, appointed **William Cranford** to its sales engineering staff.

Lawrence A. Appley, president, American Management Association, was elected a director of **Harris-Seybold Co.**, Cleveland.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., appointed as new officers: **Robert F. Rentschler**, vice president assigned to special duties; **J. M. Heppenstall**, treasurer; and **L. E. Leinbach**, secretary.

Charles W. Pinkerton was named Coatesville, Pa., district office sales supervisor, **Lukens Steel Co.**, replacing **John W. Martin**, recalled to active duty with the Air Force.

E. M. Heinmiller was elected president to succeed **A. J. McAllister**, retired, of **Fairfield Mfg. Co.**, Lafayette, Ind.

Arthur Peacock was named assistant secretary-treasurer and controller, **Borg-Warner International Corp.**, Chicago.

Dampney Co., Boston, appointed **Howard N. Verrault** Chicago branch manager.

Appointments at the government synthetic rubber plant at Institute, W. Va., are announced by the **B. F. Goodrich Chemical Co.**, plant operator. **Tom B. Nantz** is plant manager; **Walter E. Brodine**, plant engineer; **Sigmund S. Michels**, technical manager; **Anton Vittone**, production manager; **Gerald A. Balzersen**, manager of industrial relations; **George R. Erb**, plant auditor; and **John R. Mix**, staff manager.

Carl Brooks was promoted to general sales manager, **General Dry Batteries Inc.**, Cleveland.

Walter L. Davidson was named sales manager, heating department, **Dravo Corp.**, Pittsburgh.

Budd Co., Philadelphia, appointed **D. A. Coyle** manager of its Charlevoix plant at Detroit to succeed **Albert Walton**, promoted to general manager of manufacturing. **W. H. Montee** succeeds Mr. Coyle as works manager, Charlevoix.

Billings & Spencer Co., Hartford, Conn., appointed **Ludwig W. Ritschel** representative in its Philadelphia territory.

R. J. Foresman, assistant secretary, **Mid-West Abrasive Co.**, Owosso, Mich., has the added position of assistant general sales manager.

Edward A. Ross was named labor relations manager for **Weirton Steel Co.**, Weirton, W. Va.

Bethlehem Pacific Coast Steel Corp. has created an orders and schedules department, centralized at its general offices in San Francisco, and placed **Joseph J. Lusch** in charge.

William G. Gerstacker was named chief engineer, **Colonial Iron Works Co.**, Cleveland. He was with V. D. Anderson Co. as manager, solvent extraction division.

Joy Mfg. Co., Pittsburgh, appointed **Frederic W. Thomas** director of purchases, and **George R. Fox**, assistant to the executive vice president in charge of the company's plant expansion program.

Henry T. Heald, president, Illinois Institute of Technology, was elected to fill the newly created directorship of **Stewart-Warner Corp.**, Chicago.

Thomas O. McMillan was appointed eastern district representative, **Warner Electric Brake & Clutch Co.**, Beloit, Wis. His headquarters will be at Lebanon, Pa.

Stran Steel Products Co., Los Angeles, formerly known as Steel Framing & Bldg. Corp., appointed **Richard N. White** general manager. He was assistant sales manager, Stran Steel Division, Great Lakes Steel Corp.

Hose Accessories Co., Philadelphia, announces appointment of **Arthur W. Gadd** as manufacturers' representative for Missouri, Kansas, southern Illinois, western Iowa and Nebraska; and **Almon O. Snyder**, factory representative for Ohio, Pennsylvania, West Virginia, Kentucky and southern Indiana.

H. W. Fagert was elected president,

H. W. FAGERT
. . . president, gen. mgr. Fageol

general manager and board member of **R. D. Fageol Co.**, Detroit. For the last year he headed a Detroit manufacturer's consultant firm bear-

ing his name, and prior to that was ... vice president, Twin Coach Co.

Kenilworth Steel Co., Kenilworth, N. J., appointed **Joseph G. Wortley** manager of sales. He was with Cold Metal Products Co., Youngstown, and Benedict-Miller Inc., Newark, N. J.

Duff-Norton Mfg. Co., Pittsburgh, appointed **T. W. Krueger** assistant general sales manager. He continues direction of advertising and sales promotion.

Charles H. Disch retired as vice president and director of purchases, **Wrought Washer Mfg. Co.**, Milwaukee.

Douglas Aircraft Co. Inc., Santa Monica, Calif., promoted **Eric Springer, Fred Herman** and **Leo Carter** to operating division general managers of the three Douglas plants in California at El Segundo, Long Beach and Santa Monica, respectively. **Harry Woodhead**, former manager, Pressed Metal Division, was named general manager of the Tulsa, Okla., division.

Expansion of facilities of **Burgess-Manning Co.**, Libertyville, Ill., includes establishment of new divisions in both Dallas and Chicago. **R. L. Leadbetter**, vice president, is in charge at Dallas, and is assisted by **S. G. Paddock** as manager-sales, and **A. P. Gallagher** as engineering assistant. **Dudley W. Day** was named manager of the new architectural products division, Chicago, and is assisted by **A. C. Kelley**, sales, and **A. T. Jorn**, engineering. **C. P. Certik** is manager of the Libertyville and Ashippun activities, with **H. A. Dietrich**, manager of sales.

Appointed general sales managers at **Ekco Products Co.**, Chicago, are: **Julian Falk**, general sales manager, diamondware division; **Jack Culberg**, general sales manager, specialized sales division; and **Donald Long**, general sales manager, chain store division.

W. W. WARNER
. . . V. P.-engineer., Davey Compressor

W. W. Warner was elected vice president in charge of engineering, **Davey Compressor Co.**, Kent, O. He was chief engineer.

Fisher Scientific Co. appointed **George W. Kelch** general manager of its Pittsburgh plant.

Westinghouse Electric Corp., Pittsburgh, appointments include: **Bruce D. Henderson**, general purchasing agent, and **Wesley H. Lees**, general traffic manager; **N. H. King**, director of the headquarters production department; **S. C. Palmer**, assistant manager, transportation department; **A. M. Harrison**, manager, transportation and generator division's direct current engineering department; and **Clarence Lynn**, engineering manager, atomic power division. **W. G. Miller** was named manager of manufacturing at Buffalo, motor and control division; **H. C. Coleman** is manager, industry engineering departments, succeeding **F. R. Benedict**, now with atomic power division.

Gerald J. Lynch will direct the new Washington defense mobilization office of **Ford Motor Co.**, and **John F. Cooney**, formerly Washington representative for the company's Office of Defense Products, was assigned to serve under Mr. Lynch.

ALEX G. McKENNA
. . . Kennametal executive vice president

Kennametal Inc., Latrobe, Pa., elected **Alex G. McKenna** executive vice president; **John C. Redmond**, vice president-metallurgical development; and **Richard J. Flickinger**, assistant secretary. Other appointments include: **Bennett Burgoon Jr.**, assistant to the general sales manager; **Gilbert Bunn**, manager, Detroit-Cleveland district; and **Douglas C. Cunningham**, manager, Philadelphia-New York district.

W. I. Tebo is Washington engineering consultant and technical adviser for **Detrex Corp.**, Detroit.

Horace T. Potts Co., Philadelphia, appointed: **John W. Reckard**, manager, steel sales; **W. C. Spencer Jr.**, product manager, handling product development, specifications and advertising; **R. F. Bickel**, manager, Baltimore office and warehouse; **C. L. Wagner**, assistant manager, Baltimore; **J. A. Stringer**, office manager; and **E. R. Potts**, assistant office manager. **J. Henry Kern** was appointed to the purchasing department to handle matters dealing with priorities and governmental regulations. **Roy K. Clement** was appointed to the special products division, handling Blaw-Knox universal buildings, grating, etc., as well as Macwhyte wire rope and slings.

OBITUARIES...

Walter Geist, 56, president, **Allis-Chalmers Mfg. Co.**, Milwaukee, died Jan. 29. He became head of the firm in 1942.

Oscar A. Lenna, 74, president, **Blackstone Corp.**, Jamestown, N. Y., and vice president, Associated Industries of New York state, died Jan. 25.

R. R. Robertson, 72, who founded the **Highway Steel Products Co.**, Chicago Hts., Ill., in 1925 and headed the company until his retirement in 1945, died Jan. 21.

Albert C. Grunwald, 71, retired secretary - treasurer, **Precision Metal Workers**, Chicago, a division of Milwaukee Stamping Co., died Jan. 20.

Leslie R. Taylor, 60, president, **International Heater Co.**, Utica, N. Y., died Jan. 28.

Frank M. Nyiro, 37, salesman, **Republic Steel Corp.**, Chicago, died Jan. 23 of injuries suffered in an automobile accident in Elgin, Ill.

Harry Gries, 69, president, **American Pipe & Flange Co. Inc.**, New York, died Jan. 27.

William P. Gregory, 83, president and founder, **New Jersey Galvanizing & Tinning Works Inc.**, Newark, N. J., died recently.

Paul W. Lawrence, 50, founder-president, **Lawrence Steel Co.**, Los Angeles, died Jan. 19 of a heart ailment.

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Half of this message has to do with FLUID-FILM —the all-purpose die lubricant for deep drawing which is:

. . . a non-pigment, semi-emulsion
. . . non-corrosive to die or metal
. . . applied by brush, roller, dip or spray
. . . readily cleanable

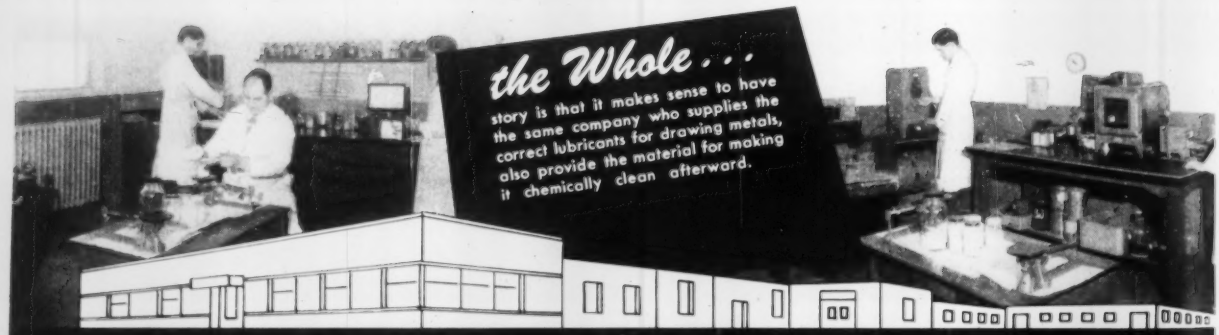
FLUID-FILM may be used on all types of metal, performing the toughest job economically—a little going a long way. And you can weld through it. . . .

HALF
Fluid-film

the other

HALF

The other half of our activity is concerned with the removal of FLUID-FILM and any other kind of soil from all types of metal. Whether the process used is spray or immersion cleaning—we have the products that will do the job perfectly—and at low cost. Let our technicians consult with you on your drawing and cleaning problems. You'll find it pays.



the Whole . . .

story is that it makes sense to have the same company who supplies the correct lubricants for drawing metals, also provide the material for making it chemically clean afterward.

NORTHWEST CHEMICAL CO.
9310 ROSELAWN DETROIT 4, MICH.

. . . serving you since '32

Production AND Engineering NEWS AT A GLANCE

STRONGER ALUMINUM ALLOY— New structural aluminum alloy is being introduced on a limited basis to the military services. It features 8-10 per cent higher strength than the present 75S alloys which are the strongest now available. Strength properties are improved by the addition of higher percentages of alloying elements such as magnesium and zinc. Higher tensiles are accompanied by lower elongation and increased notch sensitivity.

POWER AT THE WHEEL— Hydraulic steering has been a long time coming on passenger cars, but it's here on one '51 model (p. 92) and should go over big with the ladies. Two hydraulic pistons, powered by an oil pump on the generator shaft and controlled through a valve block on the steering column, give the extra push on the steering pitman arm and reduce manual effort on the wheel by 90 per cent. Sponsors hope the incidence of "little-finger" steering will lead to no resurgence of one-arm driving. Skipping that angle, the design will permit progressive lowering of steering gear ratios, maybe down to 9:1, with no sacrifice of handling ease at low speeds or when cramping into a parking space.

PERFORATING SPEEDED— Cartridge cases for projectiles used in recoilless rifles, newest infantry weapon, have been made by cupping and drawing from spheroidized steel plate, then perforating the sides by punching out a single row of holes at a time. Revision of this practice calls for perforating all holes in flat stock at a single swipe, then roll forming the case and electric welding the seam and base plate. Many cases now are being finished in a dark brown baked-on phenolic resin, instead of the translucent yellowish material once used, which made steel cases look like brass.

BIG SQUIRT— World's largest is the claim for a new 300-ounce injection molding machine recently placed in operation by an Indiana molder. Double significance is attached to the equipment in that it not only opens up new fields for plastic products but also will produce larger moldings with lower operating expense. No specific product has been scheduled yet for the machine which is tabbed for operation early this year but many possibilities are being probed—large refrigerator parts, luggage, kitchen equipment, plumbing equipment, washing machine tubs, radio and television cabinets, record players, to name a few. Capacity of injection molding machines has been relatively low, starting 12 years ago with only 6 ounces and reaching 60 ounces in 1949. The new 300-ounce unit and its pre-plasticizing attachment weighs 152,000 pounds and is 31 feet in length with an additional 11-foot pumping unit. Clamping capacity is 1500 tons and the drive is through a 90 hp motor.

FINISHING AND CLEANING— Tumbling metal parts for deburring, descaling, polishing, bright honing and even coloring, with stone chips, steel balls or other special abrasives can yield some surprising results (p. 81) in terms of finish, precision and cost. At the same time it is no cure-all for finishing problems and must be weighed carefully against the application involved. A lesser known technique for metal cleaning (including degreasing) is by ultrasonic vibrations transmitted through a liquid. Two steel companies have made experiments on flat stock, and the method now is reported to have been adapted to cleaning of threaded parts up to 4-inch diameter.

POLYMERIZING SEALER— Anaerobic permafil is the frightening term applied by GE research scientists to a new material which remains liquid as long as a stream of air bubbles through it but which hardens in a few minutes when away from air. Still not out of the laboratory stage, "AP" is seen having possible applications as a tight seal for stopping nearly invisible leaks or as a "pipe dope" for sealing threaded unions. It is the latest in a series of related compounds called permafils, originally termed solventless varnishes. They harden by polymerization instead of by evaporation of the solvent. Faster hardening may be accomplished by application of mild heat and in addition certain metals, such as copper, iron and silver solder, exert an accelerating action on the hardening process even at room temperature.

—*A.H.A.*

Metalworking Outlook—p. 39 *Market Outlook—p. 157*

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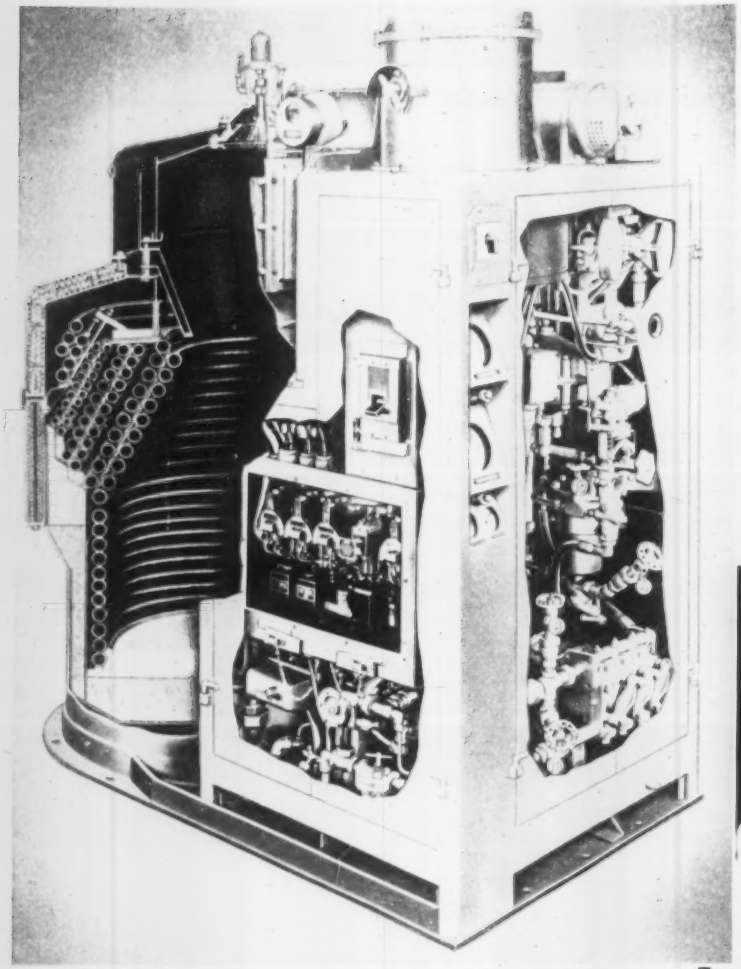
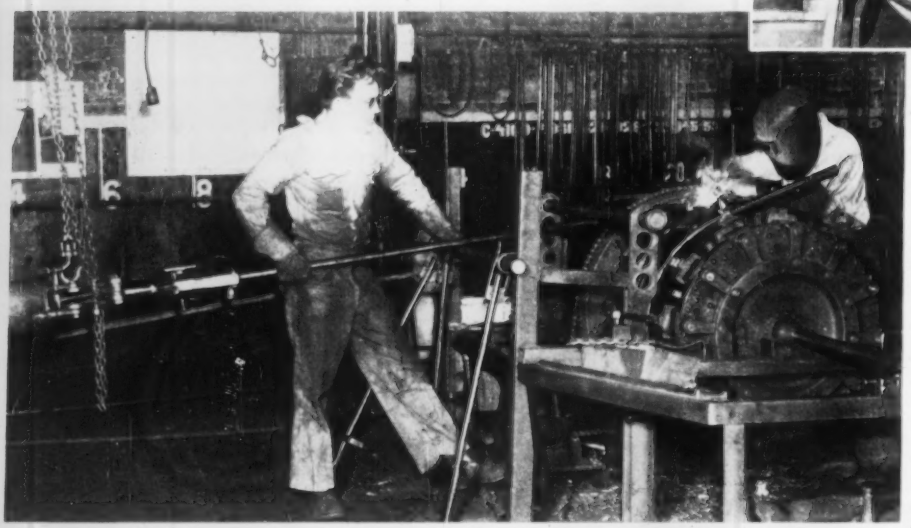
STEAM



Left—Cut-away view of Vapor-Clarkson model OK-4740 steam generator showing how 702 feet of seamless coils are nested in the unit's generating section

Right—Operator is welding ends of ASME A-83 seamless steel tubing together. It must be skillfully done in order to secure a strong weld without obstructions being built up on the inside of the pipe. Several sections are welded together making a 200 to 300-foot section for subsequent rolling into a coil. Mechanism behind the welder rotates the tubing at a slow constant speed so that a molten bubble of steel welding rod material rolls smoothly around the pipe in making the weld. A manually-operated foot pedal controls pipe rotation



Left—After welding tubing into long lengths, one end is made fast to a jig on this specially made coil-winding machine. As the 5-hp motor chain-driven jig rotates, the steel is rolled cold into coil form. Device at left puts a patented kink into the coil, shaping it so as to expose the greatest portion of the surface to the hot gases which are forced over and around the coils during conversion of water into steam

M COIL FABRICATION

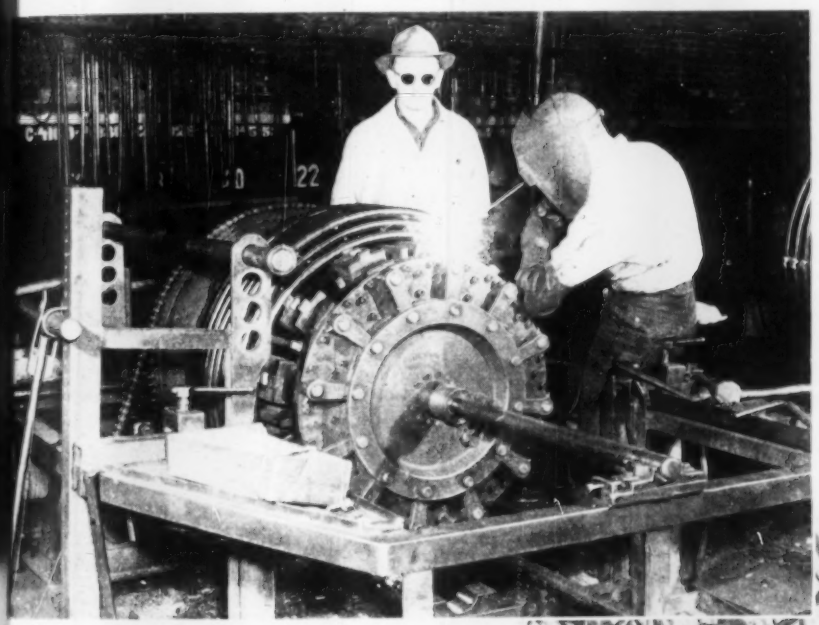
Combines Latest Forming, Welding Methods

By DAN REEBEL
Associate Editor, STEEL

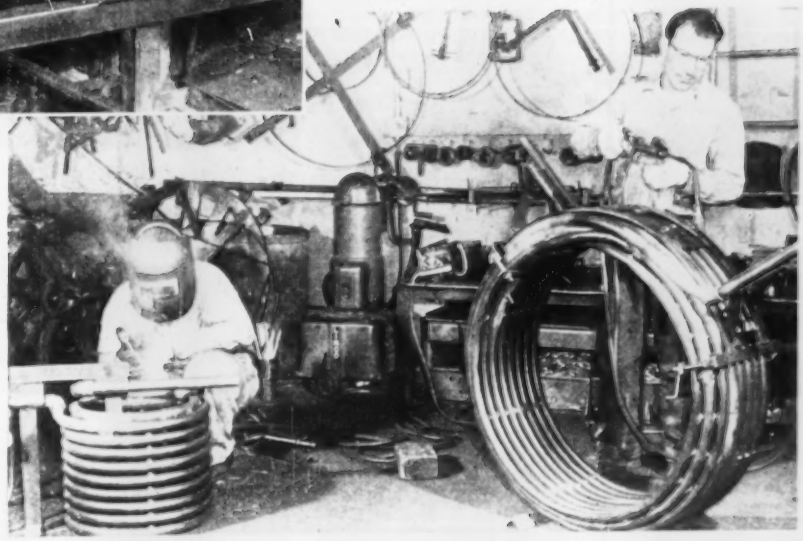
DIESEL-HAULED passenger trains would not be practical today were it not for inconspicuous steam generating plants tucked away in the back of locomotive units. These ingenious steam producers, built by Vapor Heating Corp., Chicago, supply the necessary steam pressure to heat the end cars of today's longest trains; it requires 20 pounds pressure at the last car.

Heart of the fuel-oil fired generator is a 702-foot long set of continuous coils through which water at 325 psi is pumped at the rate of 5 to 7 gallons per minute. As much as 15,000 pounds of steam per hour up to 600 pounds working pressure is produced automatically by locomotive firemen at the mere touch of a button. This unit can change 10 gallons of water per minute into high-pressure steam—yet it cannot blow up because no reservoir of water is heated under pressure. That's enough steam to heat 96 five-room houses during zero weather.

Fabrication of the coils embraces many interest-



Left—Steel spacers are welded between the coil turns to insure a proper amount of opening for hot gases to wipe over all surfaces. This specially designed fixture is made to collapse so the finished coil may be easily slid off, saving manufacturing time. A special fixture is used for each different coil size



Right—To insure that each new steam coil will be interchangeable with others of the same model, special locating fixtures are made to hold both coils and fittings, while fittings are welded into place. Operator at right does not require dark glasses because he is only heating a pipe prior to making a bend

Photography by the author

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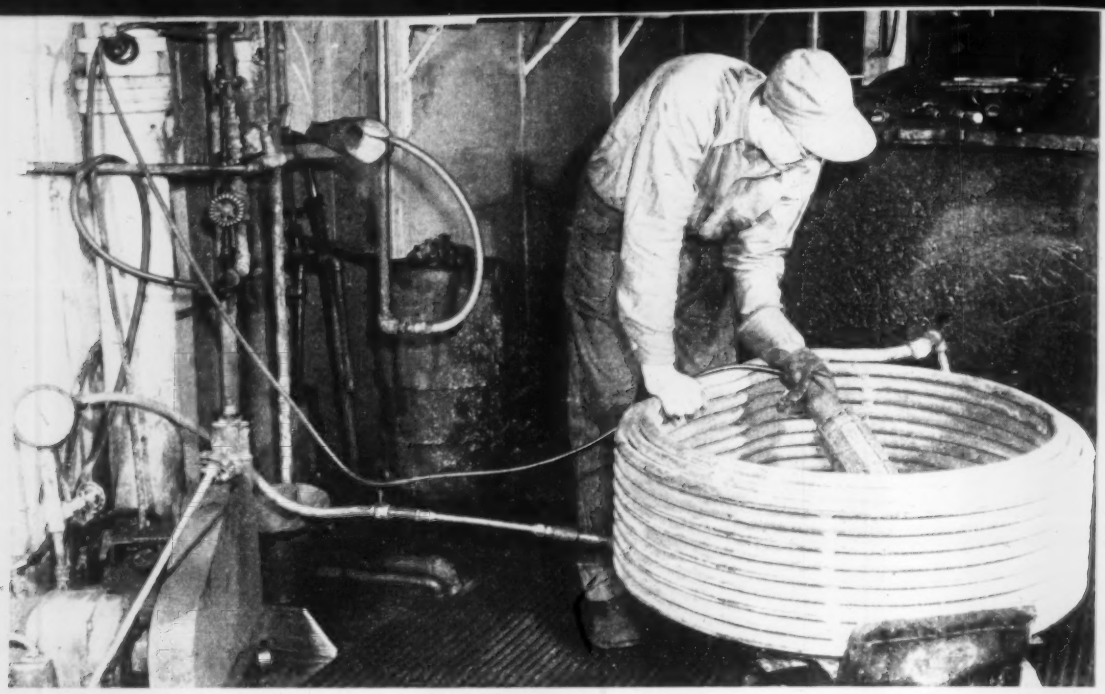
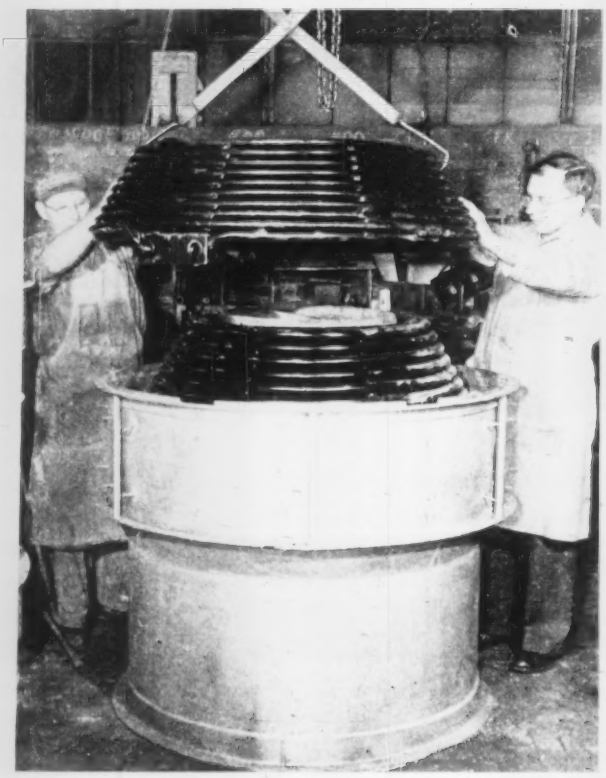


Above—Each finished coil is given a 1200-pound water pressure test to meet Hartford and ASME specifications in order to check on leaks, which are seldom found, but always corrected and then retested. Next the coils are dipped in the tank shown in background to receive a rust-protective coating



Left—Here 702 feet of seamless steel coils are being nested together inside a steam generator during assembly. This unit will soon be making over 4800 pounds of steam per hour. Steel plates are welded to the bottom turn of the coils which ride on steel brackets holding the coils; this is necessary in order to withstand the rugged vibration encountered in today's high-speed diesel locomotives. A forced-draft fire of atomized diesel oil in the center of the coil nest releases over a million Btu per cubic foot of combustion and is comparable to the heat released by a modern jet airplane

ing operations comprising: Welding straight lengths of seamless steel tubing end to end; coil winding; welding; and hydrostatic testing and inspection. Welding is performed by certified welders in accordance with ASME specifications.

Seamless Tubing Does the Trick—These continuous heating coils are staggered, which acts to split the flow of hot combustion gases into thin films which contact all the coil's surface before going up the stack. They are made of a special ASME approved A-83 seamless steel tubing—$\frac{1}{2}$ to $1\frac{1}{4}$-inch ID in mill lengths of 18 to 24 feet—designed to accept the operating conditions of both fire and water flow. Each finished coil is checked and given an approved number by Hartford Steam Boiler & Pressure Vessel Inspection Co.

All functions of coil production are handled in a separate department with material in process moving in a straight-flow manner. Thus, there is no backtracking between operations with its attendant increased production costs. After completion, finished coils are buggy-transported to another area of the plant where all generator components meet and are final-assembled.

Other industrial uses to which this small compact steam generating plant has been successfully applied include: Oil well drilling, pile driving, concrete curing, food processing, steam for ready mix concrete plants, heating tank cars, chemical processing, asphalt plants, steam cleaning, dry cleaning, foundry operations, and other applications requiring a portable, efficient and automatic source of steam.

SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

DANGEROUS ECONOMY: One of my good friends in the machine tool industry upon whom I can always depend for worthwhile ideas, is John J. Ladden, general manager, O. S. Walker Co. Inc., Worcester, Mass.

In the course of one of his swings around the circuit, John came to see me in Cleveland a few days ago with some hot first-hand impressions—particularly as to the state of the surface grinder business and that of the closely related magnetic and vacuum chuck business.

In his estimation, altogether too many new production machine tools today are not proving to be "the world's best investment". The reason why they do not "pay off" as they should is because they are hampered by slow, weak and generally ineffective workholding devices transferred to them from old model machines. This applies not only to standard chucks, etc., but also to special fixtures of many kinds and it applies to many machines other than grinders.

Apparently, the reasoning behind this situation is that saving on tooling will help to counterbalance the cost of the new machine tools. This reasoning is entirely fallacious—in that any such so-called savings in tooling very promptly are cancelled out by resulting "slow-down" of the new machine tools.

This slow-down effect is due to several factors, the biggest one being the "unhandiness" of many of the older devices insofar as loading and unloading work is concerned. This means that the new machine tools function way below 100 per cent efficiency, even though their speeds and feeds may be up to maximum. A machine earns only when it produces.

In other cases, weakness of the old fixtures makes it impossible to hold work safely and securely at maximum speeds and feeds of which the new machines are capable. In such cases the increased metal removing ability of the new machines is sacrificed to the god of false economy in tooling.

It seems to me that these points which were emphasized by John Ladden, are particularly important at this beginning phase of the war production program. Right now a lot of World War II tooling is being taken out of "mothballs", undoubtedly with the idea of applying it to post World War II machine tools. Already we have run into combat difficulties because we depended too much on some of the weapons of the last war at the beginning of the present emergency. Let's not allow outmoded tooling to get us into comparable production difficulties.

MACHINE FOUNDATIONS: In connection with extensive reshuffling of machine tools which will come with conversion to war work, make sure that the underpinning is solid and that the equipment is carefully leveled up on properly designed foundations.

Even the heaviest machines can be thrown out of line and their original accuracy destroyed if they are set up on weak or uneven foundations. The same thing is true if they are not carefully leveled up on solid, even foundations.

Machine tool builders send explicit directions for the setting up of new machines—including in many cases detailed blueprints for cement foundations. That is true particularly of planers, horizontal boring mills and large grinders. Hunt up those instructions and follow them to the letter when moving day comes.

Examination will show that even those machines with heavy box beds reaching down to the floor, in many cases have closely spaced jackscrews in the flange around the lower edge of the bed. These leveling screws are there for the purpose of lining up the bed and keeping it lined up. This is no job for a carpenter's or patternmaker's level either — it calls for use of a machinist's level of the highest quality, used step by step over the entire area of the bed.

One of the things which makes a machine tool builder's blood boil, is to find a machine upon whose alignment loving care was lavished—"grouted in" with cement like a watering trough in a cow barn.

SIMPLIFIED DRAWINGS: Despite unending efforts on the part of inventors and designers to "transfer skill and intelligence to machines," working drawings—usually blueprints—continue to be the basic "maps" which direct tool shop and machine shop operations.

During World War II, considerable thought was given to ways and means for simplying mechanical drawings so that they would be readily understandable to thousands of new workers not initiated into the mysteries of blueprint reading. Among the expedients tried were the old ones of shaded, isometric and "cabinet" drawings more pictorial in nature than standard "orthographic projections."

One of the most promising of the simplified systems was that of dimensional photographs. These photographs were taken of wooden models or actual pilot model parts—lenses of 50-inch focal length being used to eliminate undue perspective effect. Dimension lines and dimensions of conventional type were drawn in on the negatives, so that the shop prints were dimensioned pictures. This system again is worthy of attention.

In the meantime, let's not make regular shop blueprints any more complicated than is absolutely necessary. I recall an incident in a patent suit many years ago, which illustrates exactly what I mean. During a hearing a set of working drawings, replete with symbols, center lines, dimension lines, sectional crosshatching, finish marks, "hex" stock notations, etc., was referred to by opposing counsel as: "Subtle, secret plans—drawn in the darkness of the night and covered with cabalistic signs deliberately intended to confuse, puzzle and otherwise to mislead honest people!"

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Eliminate Idle Time From Machine Cycles

EYES and ears of more than 7000 administrative, engineering and production men who attended the 1951 annual meeting of the Society of Automotive Engineers, constantly were on the alert to see and to hear everything indicative of size and character of the national defense program, and ways and means for its accomplishment.

Small Plants in the Act—Citing the planned build-up of our armed forces to 3,500,000, Archibald S. Alexander, under secretary, Department of the Army, quoted President Truman as follows regarding materiel requirements: "We are going to produce all the weapons and equipment that such an armed force will need.

"Furthermore we will make weapons for our allies and weapons for our own reserve supplies. On top of this, we will build up the capacity to turn out on short notice arms and supplies that may be needed in the event of a full scale war."

Impact on industry in general will be tremendous, for the reason that subcontracting will be utilized as never before to spread defense production far and wide—small plants as well as large ones thus being "brought into the act."

Basic Factors Re-engineered—New or improved manufacturing methods will be of paramount importance both to prime and to subcontractors in production of all sorts of army, navy and aviation "hardware." One paper in particular which is in keeping with the spirit of these times was the joint work of Michael Field and Norman Zlatin, partners in Metcut Research Associates, Cincinnati. Under title "Increasing Productivity in Production Machining," these authors made definite practical recommendations for re-engineering certain basic factors which control "floor-to-floor" manufacturing time.

First and foremost, they emphasized that time required to do actual metal cutting is only one of five time elements in a typical machine tool cycle. While it is true that fast cutting does tend to "pep up" the tempo of the entire cycle, common sense must be used to keep economic balance between cutting speed and related time between tool grinds and overall tool life.

Concentrate on Tooling—Investigations by these authors have shown that cutting speeds up to 1200 surface feet per minute now are practical with carbide tools on certain kinds of irons and steels running in some of the latest machine tools. On the other hand, while speeds ranging from 2000 to 20,000 fpm actually have been attained on ferrous alloys, their conclusion to date is that such feats generally remain in the category of "trick performance."

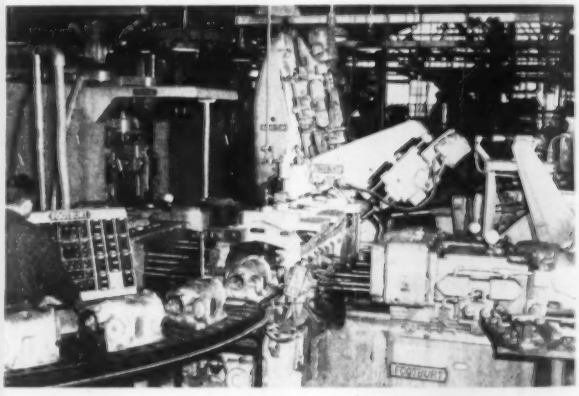
For the time being it will be more profitable for tool and production engineers to concentrate on improvement of work loading, clamping and unloading methods—with special emphasis on multiple fixtures which will permit loading and unloading in certain positions while machining is going in other positions.

These authors also called attention to importance of giving attention to machining considerations when designing parts. If specially formed cutters can thus be made unnecessary, that will effect savings. Surfaces which are flat, in a single plane and free of shoulders, make for economy in milling and broaching. By the same token, parts to be turned should embody a minimum number of tapers, steps and fillets. Pads and lugs which extend beyond major surfaces may necessitate fancy milling operations, whereas if such pads or lugs can be "designed out," more highly productive and less costly broaching can be used.

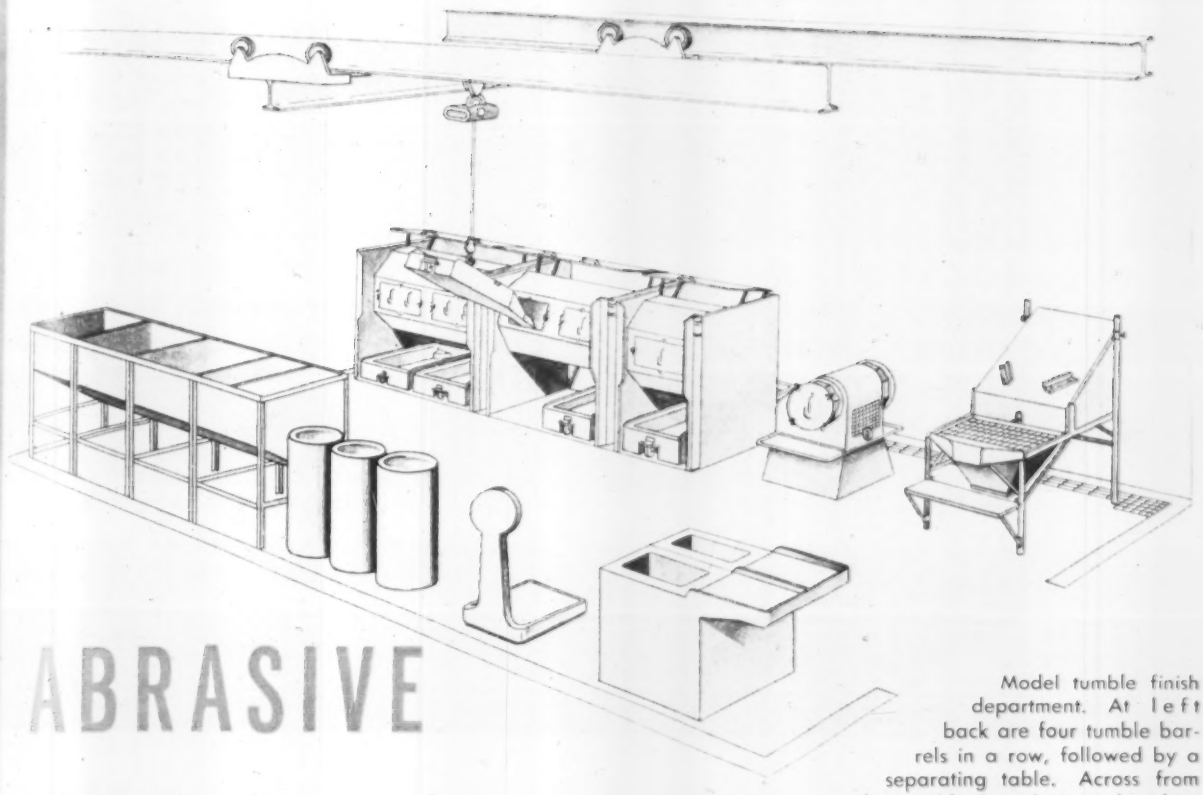
Split Operations—While carbide tooling holds possibilities for high machining speeds, there are many cases where drilling, broaching and forming call for cast alloy or high speed steel tooling. Where various operations are involved in one machine—as in multiple spindle automatics—the longest single operation dictates the time per piece. If the longest single operation—deep drilling for instance—happens to be one which is confined to high speed steel tooling, then there may be no advantage in using carbide tools on the other operations.

In that case, study should be made of possibilities for "splitting" the longest single operation into two or more short ones. Often this can be done by partial machining at two or more stations. With the advent of carbide-tipped drills and carbide-faced forming tools, these hindrances to 100 per cent carbide tooling are being eliminated.

Pushbutton Drilling and Reaming Line



ONE of the first to be installed and typical of several Foote-Burt Co. transfer lines for drilling and reaming the scores of holes required in cast iron cases for automatic transmissions is this 18-station unit at Packard in Detroit. In all, there are 96 spindles approaching the positioned cases from all angles as they are indexed through the work tunnel. All feeds and transfer movement are hydraulically controlled through the 23 units making up the line which drills, taps, bores, spot faces and chamfers, counterbores and reams the various holes. Production is at a rate of 45 cases an hour



Model tumble finish department. At left back are four tumble barrels in a row, followed by a separating table. Across from the tumble barrels are chip bins and rinse tanks. Note storage for compounds, scale, rust prevention oil tank (next to scale). Above the tumble barrels is a bridge crane trolley, hoist beam, rail, hoist trolley and a 2000-pound-capacity air or electric hoist. Courtesy Roto-Finish Co.

ABRASIVE TUMBLING

• • • A Precision Finishing Method

Volume producers are using modern tumbling techniques advantageously to deburr, burnish, hone and to perform finishing operations on large and small parts made from a variety of metals

FINISHING a metal part after it is fabricated is often an expensive, time-consuming process. A principal reason for inefficiency is the amount of manual labor required to remove edge roughness, burrs, excess metal and numerous types of surface irregularities.

One logical approach to the problem of preparing surfaces is to handle the work in bulk rather than individually. This is being done in many plants using precision tumbling methods.

Does Many Jobs—Discussing metal finishing by abrasive tumbling at the 37th annual convention, American Electroplaters' Society, Hubert M. Goldman, Enthone Inc., pointed out a number of production-improving possibilities for modern tumbling techniques. Abrasive tumbling can be effectively used in its roughest form for removing skin and fins from castings and scale from forgings. A more carefully controlled operation will take off flash and burrs, wire edges, rough spots, scale, and rust and will cut down a metal surface to a uniform condition. Both operations effectively blend in chamfers and formed radii or will round off corners and sharp edges. Still finer control can result in considerable surface finish improvement with respect to a microinch finish and to color or appearance.

Other benefits of abrasive tumbling: Uniformity of the finish, with the result that rejects are reduced to an absolute minimum, often to zero. Every item entering the barrel in a uniform condition will be taken from the tumbling operation with a uniform finish. This advantage also occurs in deburring operations or in breaking of corners and edges. An additional benefit is partial or complete surface finishing of the parts while other operations such as deburring are being accomplished. Specially-trained personnel, such as may be required for polishing, are not needed; and the mass production per unit of time adds further to the reduction of costs.

Roto-Finish—One series of engineered mechanical finishing systems using tumbling methods is known

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commercially as Roto-Finish.[2] Basically these processes which involve various tumbling sequences employing wet mixtures of specially developed chips and compounds, provide high flexibility in finishing ferrous and nonferrous metals and alloys. Four basic types of operations are performed: (1) Grinding, deburring, and descaling; (2) polishing; (3) bright-honing, and (4) coloring. Iron, steel, stainless steel, brass, aluminum, magnesium, copper, and zinc alloys in the form of stampings, forgings, extrusions, machined parts, sand castings or die castings, from small parts weighing considerably less than an ounce to intricately shaped parts weighing as much as 75 pounds each have all been finished by the method.[3]

Several types of chips are used. Grinding chips are used for grinding, deburring and descaling. Large-size chips provide a faster cutting action but leave a rougher surface than smaller, slower-cutting chips. Bright-honing chips produce a fine, smooth, lustrous surface. Size and type of chips used depends on such factors as size of part being finished, degree of luster desired and number and location of openings in the work being tumbled. Steel balls or other highly polished steel coloring media can be used when desired.

Steel Ball Coloring—Tumbling methods can also impart a final bright lustrous finish to magnesium parts that have passed through the other tumbling procedures.[4] Steel ball coloring is usually employed for this purpose. However, such a tumbling procedure tends to peen the parts rather than cut or grind them, and thus does little to cover any surface defects in the metal. The coloring solution is generally used warm to prevent scum formation on the work. The tumbling solution is added to the barrel in a quantity that is sufficient to "blanket" both the magnesium parts and steel balls with a 2 to 4-inch layer of solution.

In many cases, the unit is rotated for approximately one hour; if a higher luster is desired, a somewhat longer tumbling period is used. The parts are thoroughly rinsed in hot water after tumbling. Drying of the parts may be accomplished by tumbling in clean sawdust or by heating in an oven or using a centrifugal dryer.

Costs Cut 50%—In a large zinc base die casting finishing plant in which production totals approximately 70 tons of die castings daily, use of the Roto-Finish process is reported[3] to have resulted in a cost saving of 50 per cent compared to former hand deburring and routine polishing and buffing operations. The labor savings effected are especially noticeable in finishing small die castings, most of which have

Above—Tumble finishing machine performs a variety of batch mechanical finishing operations on metal parts. This is a two-compartment, horizontally-operated, octagonal unit. Courtesy Enthone Inc.

Left—Typical parts shown before and after abrasive tumbling using the Supersheen process

irregular contours, short radii, and relatively inaccessible internal surfaces.

A medium-size maker of automotive parts and plumbing hardware has used six Roto-Finish units with a single operator to deburr an average 12,000 pieces in 5 hours. The process is also used to grind, polish and bright-hone small die castings and small stampings. In one instance, the cost of buffing a small part was reduced from $14.40 to $5.30 per thousand pieces by substitution of the Roto-Finish mechanical tumbling process for buffing.

Equipment for Roto-Finishing—In all Roto-Finish tumble grinding, deburring, and bright-honing procedures work and processing chips are used with water to which certain recommended compounds are added to increase the cutting power of the chips. These compounds also perform other important functions: Lubrication of both chips and parts; maintenance of compartment and chip mass in clean condition; and prevention of glazing or loading of chips

with fine metallic particles removed in processing work.

The machine is essentially a motor-driven, horizontally operated, octagonal cylinder. Equipment is available with one, two, three or four hardwood-lined compartments in which loads of either duplicate or dissimilar parts can be processed as needed. The smaller midget type tumbling machines are used for small loads of moderate size parts, or for loads of very small parts. Staggered schedules allow one compartment to be charged and another unloaded with a minimum of down-time.

The tumbling machines are generally arranged side by side in a line. The floor on which the machines operate is sloped toward a drain trench designed so that the refuse from processing may be easily disposed of. An overhead handling system and a specially-designed hoist pan is used for loading and unloading parts and processing chips.

A typical cycle on a load of parts using a Roto-Finish tumbling process would involve the following steps:

I. Load mass and parts into compartments of the machine. The simplest method is to use a hoist pan lifted by an electric hoist operating on an overhead bridge crane.
II. Add the recommended amount of water and the specified compound.
III. Lock the loading doors in position.
IV. Start the cylinder rotating and allow parts to process for the recommended time.
V. Remove parts and mass from the machine by dumping into hoist pan.
VI. Separate parts and mass from the machine using a screen of proper mesh size.
VII. Dry parts and send to next operation.

Time Depends on Results Wanted—Processing time varies over a wide range and depends principally on the results desired and is influenced by the shape, size, weight, contour, hardness and kind of metal of the part being finished. In general, deburring time varies from 15 minutes to 10 or 12 hours. Grinding time is usually 8 to 48 hours. Polishing time, 15 minutes to 16 hours. Bright-honing, 1 to 3 hours. Coloring, 15 minutes to 2 or 3 hours. The average time reported for deburring machined or stamped steel, brass or aluminum parts is from 1 to 4 hours. Average time to finish a zinc base die casting preparatory to electroplating with copper, bright nickel and chromium is 6 to 8 hours.

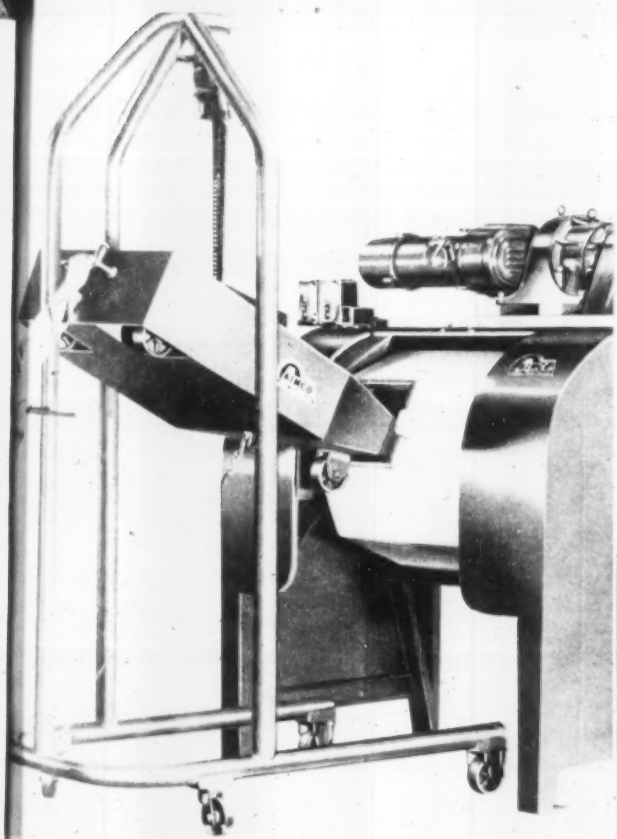
Polishing by tumbling uses bright-honing chips together with compounds. The result of the tumbling polishing process is usually a smooth finish, but is not lustrous until after honing, which often follows the polishing operation. In such cases, after polishing, the parts and chip mass are not removed from the machine but are thoroughly washed in the compartment and a bright-honing compound is added causing the chip mass to act as a honing medium on the parts. This treatment is used for finishing hardware items for automobiles, plumbing, building and appliances, and on many other parts where a good finish is an important characteristic to be achieved at lowest possible cost.

Following bright-honing a wet coloring process may be used to produce a high color on various types of parts.

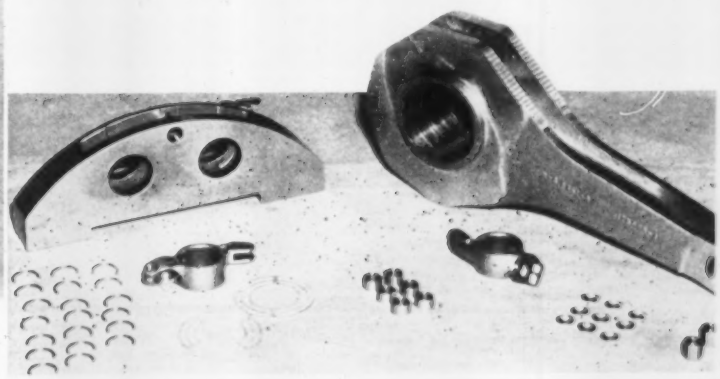
Supersheen Finishing—A precision tumbling method known as Supersheen has been developed by the Almco Division, Queen Stove Works Inc., Albert Lea, Minn. The method has been used in mechanical finishing a variety of metal parts by tumbling in an engineered combination of chips, compound, and water.[5] It is reported that the process can be used for deburring, cutting-down, finishing to microexactness or for coloring ferrous or nonferrous parts.

In a review of ten Supersheen installations, it was

Below—One type of tumbling barrel with hoisting unit and hoist pan typical of equipment used with the Supersheen process. Courtesy Almco Division, Queen Stove Works Inc.



Right—Aircraft engine parts finished by abrasive tumbling using Alundum. Courtesy Norton Co.



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claimed that finishing costs averaged 80.1 per cent less than former methods—from 48 per cent on a threaded iron pipe "T" to 95 per cent savings on a steel trigger with intricate configurations.

One production advantage claimed for the process is the large volume of production that is possible—up to 4000 pieces processed at one time. A single unit installation is reported to have replaced from two to 12 men.

On fine precision parts the process may be held to within 0.0002-inch tolerances. In tumbling operations on gear tooth surfaces the surface approached run-in condition.

The tumbling chips come in two grades, regular and fast cutting, and nine different sizes of both grades.

Chip Sizes Combined—Difficult deburring and finishing jobs are sometimes done best by combining a larger size chip with a smaller size. The larger chips press the smaller sizes into recesses such as holes, threads, etc. For all operations, the chip size should be small enough so they do not wedge in any slots or openings of the piece.

Three different compounds have been developed to assure maximum flexibility of the tumbling processes. Compound No. 1 adds brightness and luster to the parts; compound No. 2 is used for fast deburring or cutting down as well as promoting lightness of color of the metal; compound No. 3 contains an added abrasive and is recommended for maximum high speed deburring, grinding, and cutting down.

A typical Supersheen finishing operation on a die cast aluminum alloy coat hook to remove die flash and polish the surface involves the following production line steps:

I. Parts are degreased. The removal of oil, grease, and dirt keeps running time to a minimum. The proper size of chips is selected and enough for a barrel charge is drawn from a storage bin into a hoist pan.
II. Chips and parts are loaded in barrel to specified level.
III. Compound No. 1 is placed in the charged barrel, and water is added. Usually, the barrel is filled to approximately 3 inches over top of chip and compound mixture. A reduction of the water load usually increases the abrasive action.
IV. The watertight door is then fastened over the opening and the barrel turned on to rotate at 20 rpm. Engineered pilot runs with actual pieces have established the specified running time to be approximately two hours for best results.
V. After 2 hours of processing the water is drained from the barrel and parts are flushed with clean water. Parts are then separated from chips by screening.
VI. To add polish and remove moisture, sawdust is added to separated parts and rotated in barrel a few minutes.

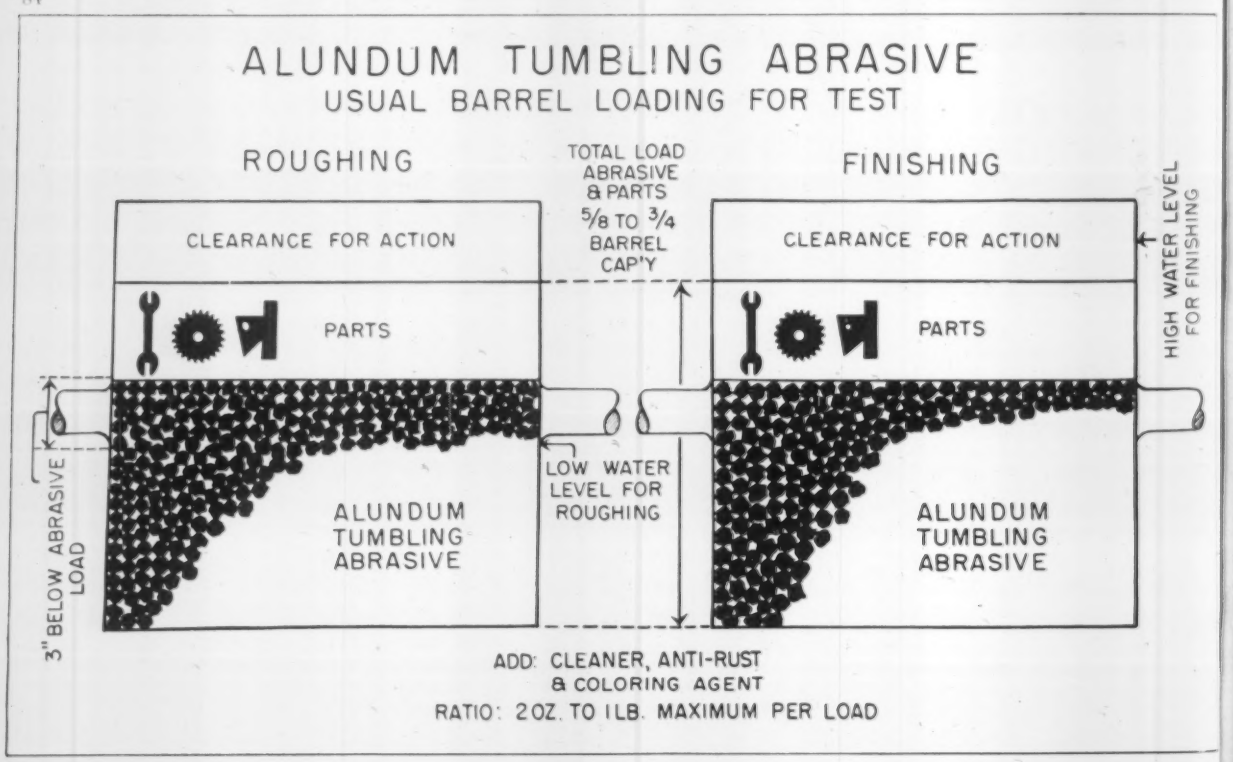
Alundum tumbling abrasive barrel loading. Based on recommendations of Norton Co.

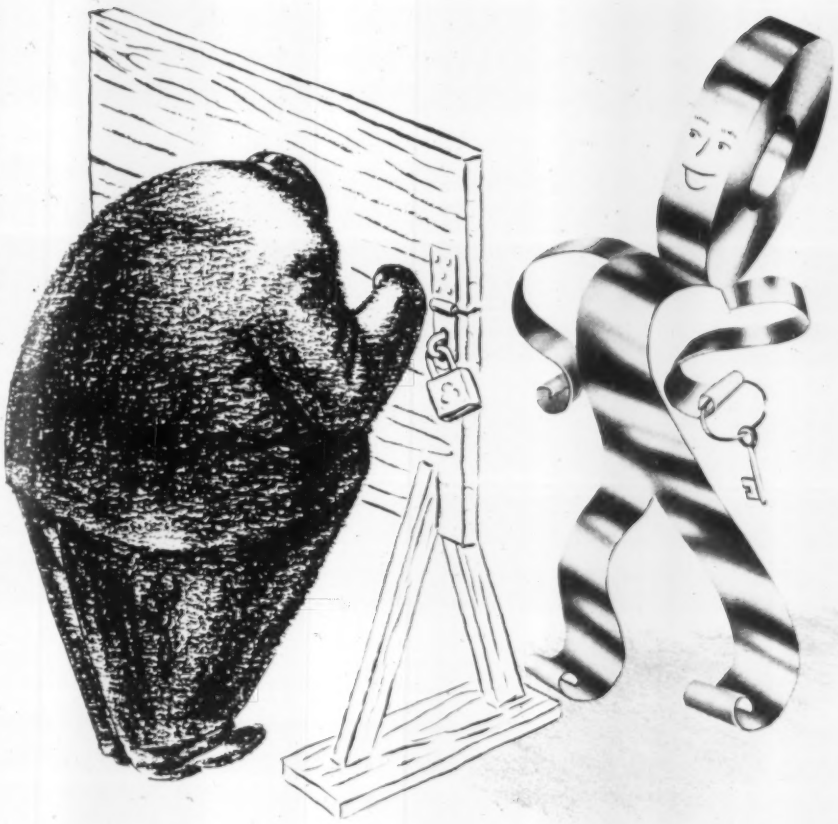
Costs on the above production job were cut from $1\frac{1}{2}$ cents per piece to one tenth of a cent per piece with an improvement in appearance and uniformity. A two-compartment barrel, each compartment being 30 inches in diameter and 16 inches wide, was used with a total production load of 4000 pieces—2000 pieces per compartment. Total direct costs including labor were only $4.05 as compared with $60 with the usual hand polishing method. 800 pounds of chips were used, which remained for subsequent runs. Lubrication was supplied with 2 pounds of compound No. 1.

Aluminum Oxide Abrasive—Alundum tumbling abrasive is finding increased use in precision tumbling many types of metal parts. According to Norton Co. this material is an aluminum oxide abrasive throughout.[6] Its weight, which is 125 pounds per cu ft, gives pressure to the abrasive against the work. The combined pressure and cutting quality of the abrasive are what produce a fast barrel grinding action.

Some of the operations in which Alundum tumbling abrasive is being used are: (1) Cleaning stampings, castings, forgings, etc.; (2) deburring; (3) forming uniform radii; (4) improving finish; (5) finishing high precision work; (6) improving microinch surface finish reading; (7) finishing threaded and miscellaneous parts; (8) removing plating; (9) removing smut.

Norton engineers point out that alundum tumbling





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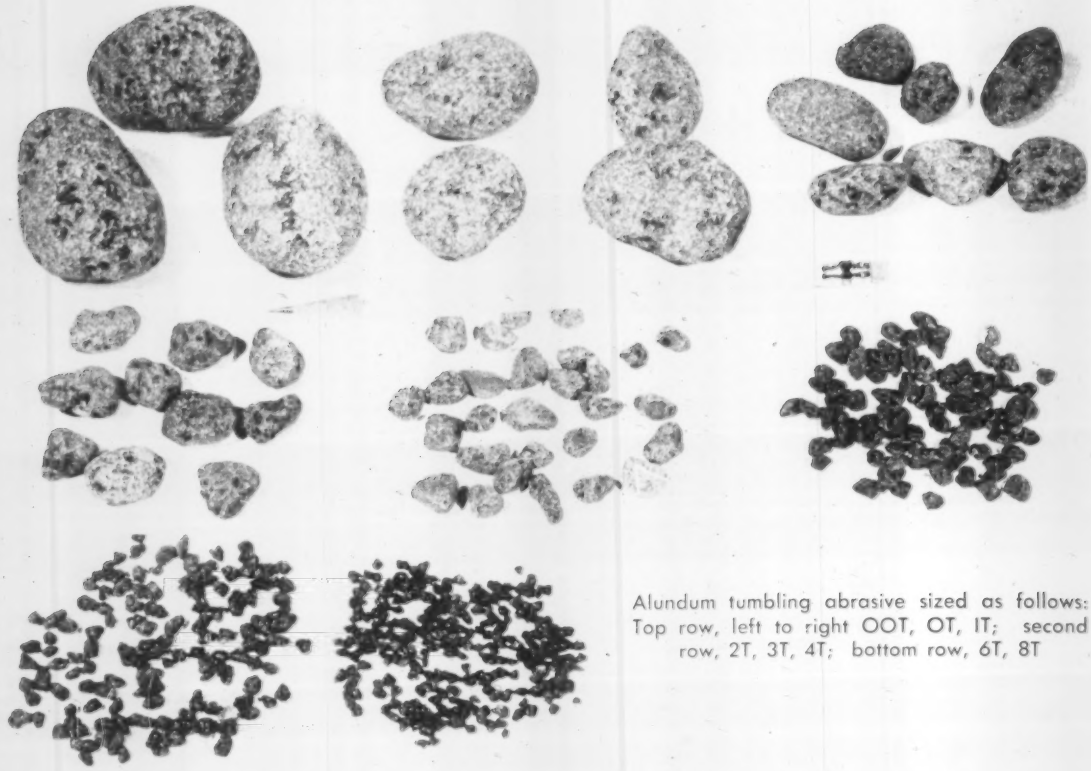

Alundum tumbling abrasive sized as follows: Top row, left to right OOT, OT, IT; second row, 2T, 3T, 4T; bottom row, 6T, 8T

has not been successful in finishing blind holes, inside of narrow slots, some inside surfaces where the abrasive grains pack into the cavity and retard or prevent the grinding action, and heavy; abnormal burrs, center cutoff burrs, or gates which should be removed by rough grinding prior to tumble finishing.

Octagonal Barrels—Satisfactory results from aluminum oxide abrasive tumbling have been obtained with the horizontal, octagonal type lined barrels, equipped with variable speed drives. Best and fastest results for general work are obtained with barrels approximately 30 inches in diameter. Number and width of compartments can vary to meet requirements. The submerged type barrel is also well suited for Alundum tumbling.

How Much Abrasive?—Grit size or mixture of sizes used in tumbling should be such that the abrasive will reach all of the recesses, fillets, angles and slots without becoming wedged in any part of the work. The amount of aluminum oxide abrasive needed for the load of work to be processed will depend entirely on the type of barrels being used and the material being finished.

On large production lots, two to four parts of abrasive to one part of work by volume should be the average ratio. An average load usually consists of three parts of abrasive to one part of work by volume. One of the outstanding values of aluminum oxide tumbling abrasive is its weight which assists in the desired action in the barrel. The total load in all cases, and regardless of the amount of parts being processed, should reach up to one-half to two-third of the barrel or compartment used.

Water Volume Important—Volume of water to use with the aluminum oxide abrasive is very important in controlling the action in the barrel and the resultant finish on the work. In general, decreasing the amount of water will accelerate the grinding action and reduce the time cycle but will also give a rougher finish. Increasing the amount of water will retard the grinding action and produce a smoother finish.

Cleaners and compounds are sometimes added to the load of abrasive and water for the purpose of giving "color" or for cleaning the parts preliminary to plating. Some are alkaline, others have an acid reaction and still others are completely neutral. The choice of cleaner or compound depends upon the material being processed and the finish requirements.

Typical Operations—The following procedure has been used in deburring, forming radii, and finishing nonferrous parts:

Barrel: Fixed horizontal octagon type.
Abrasive: Aluminum oxide type, grit size selected according to the parts being processed.
Water: To reach to approximately 2" above the level of the mass.
Cleaner: For bright finish on brass or bronze, a special compound should be used mixed with water in the ratio recommended by the supplier.
Time Cycle: 1 to 6 hours, according to requirements.
Wash: Wash parts before and after each tumbling operation.
Dry: Use infrared lamps.

Abrasive tumbling may be used to finish parts to a microinch finish. Precision parts such as roller bearing rolls, shafts and cams, are tumbled to microinch readings. In one plant a 10 microinch reading on the periphery of a small steel bushing was reduced to 6 rms after tumbling for 3 hours with tumbling abrasive using the procedure described below:

Barrel: Fixed horizontal octagon type.
Abrasive: Alundum tumbling abrasive in sizes #4, #6, or #8 mesh.
Water: Should reach 3 to 5 inches above the level of the mass.
Cleaner: Use a ferrous cleaner.
Time Cycle: Approximately 3 to 4 hours, according to requirements.
Wash: Barrels, parts and abrasive should be washed before and after the tumbling operation.
Dry: Infrared lamps are recommended.
Oil: Oil dip parts as a rust preventive.

Plating can be stripped by abrasive tumbling.

The operation will remove the plate and refinish the parts preparatory to replating in the comparatively brief cycle of 1 to 2 hours. In many cases, it has been found to eliminate repolishing operations that must be used following other chemical and electrochemical stripping methods.

How to Choose Tumbling Media—No one tumbling medium can be most economically and most satisfactorily used for all types of barrel finishing operations. Thus, a solid aluminum oxide abrasive would not be expected to produce a higher gloss than that produced by a hard smooth pebble. On the other hand, a part requiring considerable abrasion for the removal of a rough surface would be more quickly processed with a solid abrasive medium than with a medium consisting of very fine abrasive bonded with rubber or a ceramic.

Each complete operation must be studied with respect to the proper medium to be used.

In discussing some of the factors that enter into a choice of the types of abrasive media, Mr. Goldman[1] pointed out that the above factors, as well as such factors as the metal from which the part is made and the complexity of shape must also be considered in determining the tumbling media to be used.

Soft metals would not suggest the use of a strongly abrasive material because of the probability of producing deep scratches. Density of the metal in combination with its box volume (complexity of shape) gives a factor known as "apparent specific gravity". This factor helps to decide the medium to be used. It would not generally be advisable to utilize a heavy medium (one of high apparent specific gravity) with a part of low apparent specific gravity. This factor, however, is thought to be not quite so important with horizontal barrels as it is with oblique units since the churning of the mass tends to mix the light parts into the medium more thoroughly. However, there is still considerable tendency for the work to float upon the medium and to receive excessive impact at the end of the slide.

Watch Chip Size—Another important point is size of chip to use for most satisfactory finishing. One factor in choosing chip size is to pick particles of one or more sizes such that contact is made with all surfaces on which action is to take place. Faster cutting occurs with the larger chips and better surface finishing or burnishing with finer chips. Chip sizes should be chosen so that they will not tend to clog holes or slots in the work.

Tumbling operations have been conducted with steel balls for many years. Hard bright steel balls have been used without abrasive for burnishing operations and annealed steel balls with added abrasives have been used for deburring or similar work. Steel slugs appear inferior to nonmetallics for operations involving actual metal removal but satisfactory for burnishing. The burnishing cycles vary from 15 minutes to upwards of 3 hours. Zinc slugs have been investigated[1] as a tumbling medium, and found to be sufficiently heavy for use with steel or iron parts and not too heavy for brass or bronze castings.

Dry burnishing, that is, operations in tumbling barrels without the use of liquids, are still conducted in some instances. Generally, very fine abrasives such as rouge are used. Coarse, friable materials such as sand are occasionally employed to help smooth the surfaces of heavy castings, but most dry burnishing is conducted on small castings or lightweight articles. Heavy castings are often self-tumbled and lighter objects mixed with sawdust, leather scrap, pieces of felt and similar media. Unlike wet tumbling or burnishing, the dry operation does not cover up surface pores or defects.

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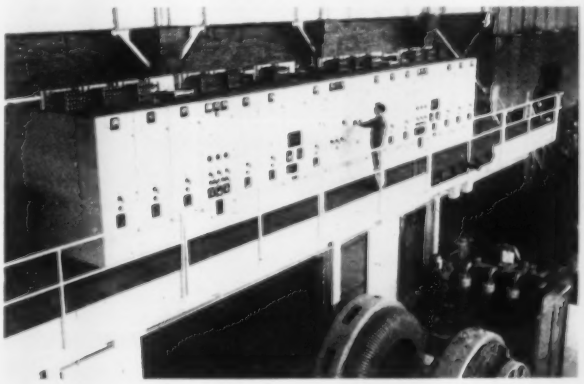
1. "Metal Finishing by Abrasive Tumbling". A paper presented at the 37th Annual Convention, American Electroplaters' Society, Boston (June 1950).
2. Based on information supplied by Roto-Finish Co., Kalamazoo, Mich.
3. Castle, C. H., *Plating* (June 1950); Schulze, A. P., *Plating* (Sept. 1948); See also *Materials & Methods* (June 1947); *The Iron Age* (May 1947).
4. "Surface Finishing Magnesium Parts"—*Modern Metals* (August 1948). Photographs of tumbled magnesium parts courtesy Dow Chemical Co., Midland, Mich.
5. Data for this part supplied by ALMCO Division, Queen Stove Works Inc., Albert Lea, Minn.
6. Based on information supplied by the Norton Co., Worcester, Mass.

Furnace Atmospheres Described

Applications for each of five different types of standard rated atmosphere furnaces to controlled atmosphere heat treating are described in detail in a recently issued bulletin. Offered by Surface Combustion Corp., Toledo 1, O., the bulletin shows the Balco, Char-Mo, Atmotrol, vertical and horizontal muffle type furnaces, and the muffle furnace with cooling chamber for atmosphere brazing.

Atmosphere generators, burner equipment and other factors are presented. The compositions of the most widely used heat treating prepared atmospheres and the generators in which they may be produced are also described in the SC-148 bulletin.

Drawout Gear Eases Maintenance



LARGEST METAL-ENCLOSED drawout switchgear for heavy-duty direct current service ever built by General Electric Co., Schenectady, N. Y., is installed at Jones & Laughlin Steel Corp.'s Otis Works blooming mill motor room in Cleveland. Breakers are mounted on rollout carriages with safety interlocks, providing easy withdrawal for inspection and maintenance. The switchgear consists of 18 breaker and control units which control two 1000-kw 250v ignitron rectifiers, a 1500-kw 250-v motor generator set and 12 automatic reclosing feeder circuits

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"HYDRAULIC ASSIST"

Steering Gear Moves Into Passenger Car Field

FOR twenty years Gemmer Mfg. Co., Detroit, has been working on power steering, still new in its application to modern high-speed motor cars. It has been used for heavy duty and "off the road" vehicles where speeds of operation are comparatively slow. In present day automobiles, power has been made necessary because of parking difficulties arising from use of the easy riding but broad tread "low pressure" tires.

Gemmer's new Hydraguide, now standard on Chrysler Imperial models, requires 40 per cent less steering wheel movement and 75 to 80 per cent less effort to turn the wheels. The power control is instantaneous in response to steering wheel movement. It does not require the driver to turn the wheel back when straightening out after taking a turn; the car recovers naturally and normally as with any conventional steering gear.

Not Dependent on Power—The mechanism consists of two basic units: One, the standard worm and roller mechanical gear with a hydraulic power device and its valves built into the same housing; the other an engine driven Eaton hydraulic oil pump, combined with an oil reservoir and filter and mounted on the engine. When the engine is not running the car steers just like any other conventional car.

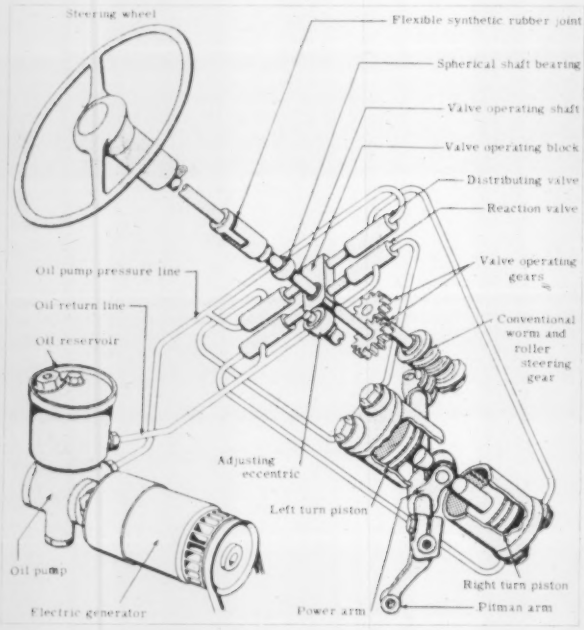


Diagram showing relationship of the various elements of the new "hydraulic assist" steering gear for passenger cars

Application of power to the steering is through two hydraulic pistons, operating in hydraulic cylinders arranged on either side of an auxilliary power arm which is attached to the shaft between the roller gear and pitman arm connected to the steering linkage. The piston heads are connected together by a yoke so they have straight line motion. To allow for accurate movement of the power arm, a hardened roller on needle bearings is provided. Hardened steel pins in each piston bear against the opposite sides of the roller. Only when there is steering action, is pressure applied to this roller, and only on one side at a time.

Power Controlled by Torque—Control of the power function is the secret of the Hydraguide's quick responsiveness. The slightest movement of the steering wheel turns the shaft and this torque is immediately translated into power steering.

The shaft from the steering wheel to the steering gear is not continuous. A flexible forked type coupling, cushioned in synthetic rubber, joins the steering wheel shaft and its extension in the steering gear housing. The extension shaft is mounted in a spherical bearing so its lower gear end can float several thousandths of an inch. However, the design only permits lateral movement of the gear end of the shaft. It is this movement which operates the valves that control the application of power.

How It Works—Details of the movement are obvious from a study of the steering gear cross section. The lower end of the spherically mounted shaft and the worm are connected through a pair of gears, having elliptoid formed teeth, instead of direct as in conventional designs. The worm is, of course, connected to the steering linkage and wheels and hence offers resistance to turning.

When the mating gear on the spherically mounted shaft is turned, it tries to do one of two things; back out of mesh or move sidewise in a plane tangent to the two pitch circles. The first movement (separation) is prevented by an eccentrically adjustable back up roller. The second movement is sidewise and operates the control valves.

The sidewise movement may be in either direction, depending on which way the steering wheel is turned. Only 0.003-inch movement of the valves is necessary to start applying hydraulic power. Power application rotates the steering gear shaft so as to reduce the manual effort required by about 90 per cent. This division of steering torque is maintained constant. As a result, when the steering wheel is released as in recovering from a turn, power is also released and the car straightens out in the conventional manner. Instantaneous road shocks are resisted since the valves respond to the (*Please turn to Page* 110)

Blast Furnace Sintering Practice Surveyed

Some of the many ways in which it is possible to show major improvement in your sinter plant operation are outlined in the following discussion

By ROBERT E. POWERS
Fellow, Mellon Institute
Pittsburgh

SINTERING, which started as a means of disposing of flue dust, has become today's major process for the agglomeration of fine ores. As such the industry is large, widespread, and mostly noncompetitive. Capacity of sintering plants in the United States in 1948 was 18 million gross tons per year, a sizable amount when compared with the shipments of lake ore in the same year of 82 million gross tons. Several new plants are being built and started at the present time. Agglomeration of fine ores should become more and more vital to blast furnace operation as time goes on, so that sintering is scheduled to make an important contribution to economic and industrial growth.

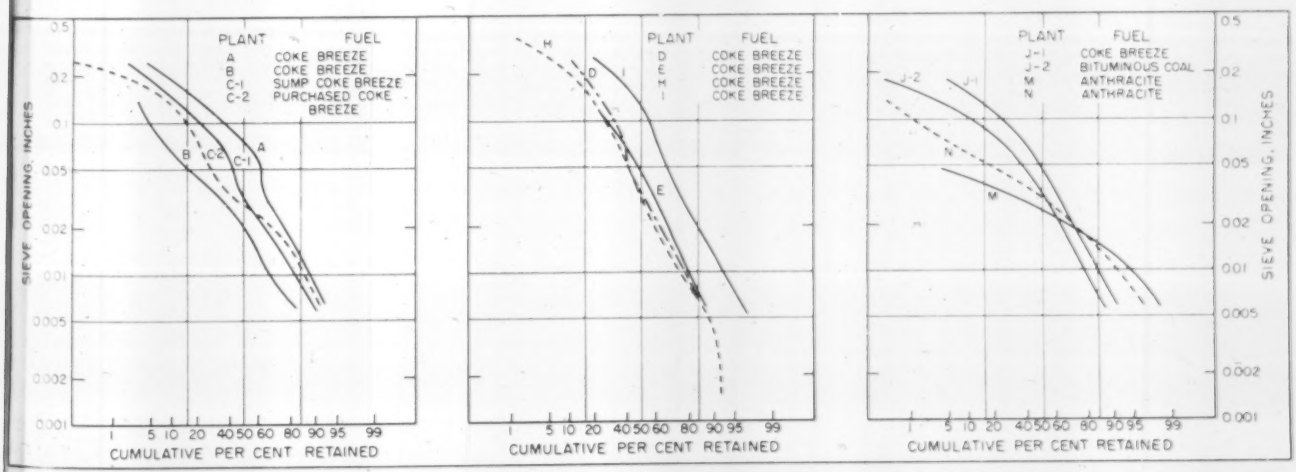
Sinter has been used in blast furnaces at most of the 15 representative plants surveyed for periods up to 10 years and at some for a period of 20 years. In general the results are not as satisfactory as desired. The broad result in most cases is a recovery of the sinter's iron units without additional benefits to furnace practice. Any improvements resulting from the replacement of ore with sinter are either too small for operators to be certain of or decidedly marginal. Possible exceptions to this general conclusion are two plants at which sinter forms an integral part of the ore supply. Here the combined results of sinter and many other factors are beneficial, but little opportunity has been experienced for practice without sinter.

It would be improper to draw definite conclusions on blast furnace use of sinter from opinions and evidence presented in this survey. Most plants have not made careful studies of effects of sinter. Where these have been tried, the outcome has often been obscured by other operating variables.

Statistical Procedures Indicated — In view of the notorious variability of blast furnace operating results and the wide experience that the effects of sinter are marginal, this seems to be clearly a situation for careful application of statistical procedures to determine the real results. One plant has made such a multiple correlation analysis of a full furnace campaign. Analyzing this on the basis of percentage of sinter in the burden, higher sinter gave higher iron production for the same wind rate, also small coke savings, but no sustained difference in flue dust. However, surprisingly, less wind was blown at higher sinter so that no gain in iron tonnage was actually achieved. Lower wind was found, in retrospect, to be the results of unrelated operations of boiler maintenance. This illustrates the care which is necessary in taking and interpreting such data. One corporation's three furnace plants are set up with personnel and organization to make multiple correlation analyses. At the time of the survey no positive results had yet been reached at any of them.

Normal percentage of sinter in the burden varies.

Screen analyses of supplemental fuels used by the various plants are shown plotted on logarithmic-probability paper



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Fire this DOUBLE BARREL *at your production costs*

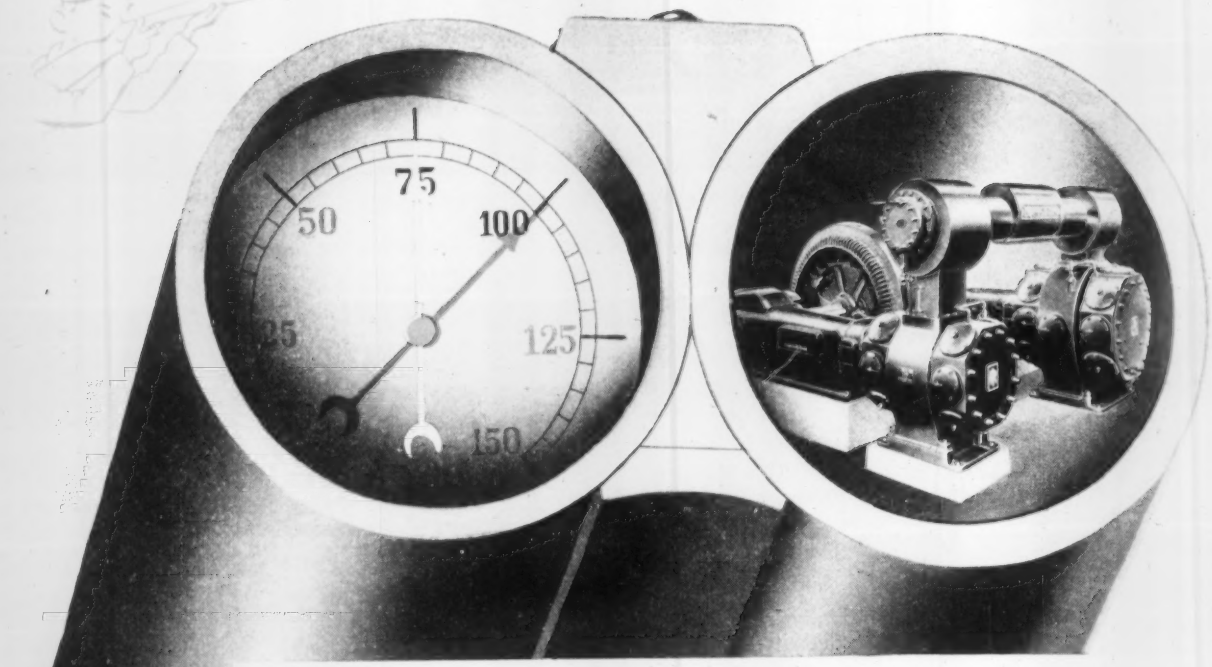

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TABLE I

EFFECT OF QUENCHING AND HANDLING ON SINTER SIZE

Plant	Water Quenching	Handling	Sinter at Furnace Larry Car Avg. size in.	Per cent −¼ in.
		GENTLE		
E	none	gentle	0.63	4
		MODERATE		
A	minor	average	0.36	19
D	some	average	0.43	14
F	minor	average	0.42	15
O	some	average	0.58	15
I	minor	average	0.50	11
		SEVERE		
B	drench	considerable	0.62	10
C	some	considerable	0.28	23
H	drench	average	0.28	24
J	drench	considerable	0.23	28
K	drench	considerable	.42	20
L	some	considerable	0.24	28
M	some	rough	0.29	24

in the plants surveyed, from 18 to 65 per cent. In most cases, this is governed solely by the quantities of sinter and ore available. Sinter is usually split evenly among furnaces. There is no plant using more sinter on one furnace than on another for reasons of improved performance.

Maximum sinter used at any of these plants has been 90 per cent, and the range for this maximum is 25 to 90 per cent.

Sinter Fines Too Great—When questioned whether present sinter is as satisfactory as desired, blast furnace operators in most plants respond that it is not. The chief complaint is that the content of fines, defined variously as material under 20 mesh to that under ¼-inch, is too great. Other deficiencies are stated to be lack of porosity, too much fusion, too wide a size range, too small an average size, and too low reducibility.

Agreement is quite pronounced on the qualitative properties desired in a sinter. These are: Size sufficient for retention in the blast furnace; uniformity of size; sufficient strength to retain the necessary size; porosity; and reducibility at least equal to that of ore.

Sinters vary greatly in their physical appearance, from porous and friable to glazed and hard. Furthermore totally different structures are often seen in the same plant's sinter or even in the same chunk, indicating that in a given plant it is not at all homogeneous.

Size of sinter is one of its most important properties. Average size of the sinters at all plants varied from 0.23 to 0.63-inch, as did the spread-in sizes.

Reducibility is not used as a control test at any plant, but some laboratory investigations have been made; it has always been found to be less for sinter than for the ores from which the sinter was made.

Bulk density of a sinter is lower than that of ores from which it is made even though iron content is higher. The net result is less iron per cubic foot of blast furnace volume. This low density is regarded as one of the drawbacks of sinter.

Raw Materials for Sinter—A wide variety of iron-bearing materials form the raw materials for sintering. The most common, of course, are screened lake ore and flue dust, with or without filter cake and mill scale. Fine ore concentrates, both hematite and magnetite, are used at some plants. Fine iron sulphide concentrates are used at two of the plants. In size, the iron - bearing raw materials range from 1 x 1¼-inch screened ore to minus 100 mesh concentrates.

Addition of lime to sinter mixtures has appealed to many operators and investigators as a means of premixing cheap basic materials with part of the blast furnace charge to eliminate some limestone and as a means of precalcining part of the limestone. It has also been theorized that silica from the ore materials slags with the lime in preference to ferrous oxide, thereby suppressing the formation of iron silicates, such as fayalite, which are said to have an adverse effect on reducibility.

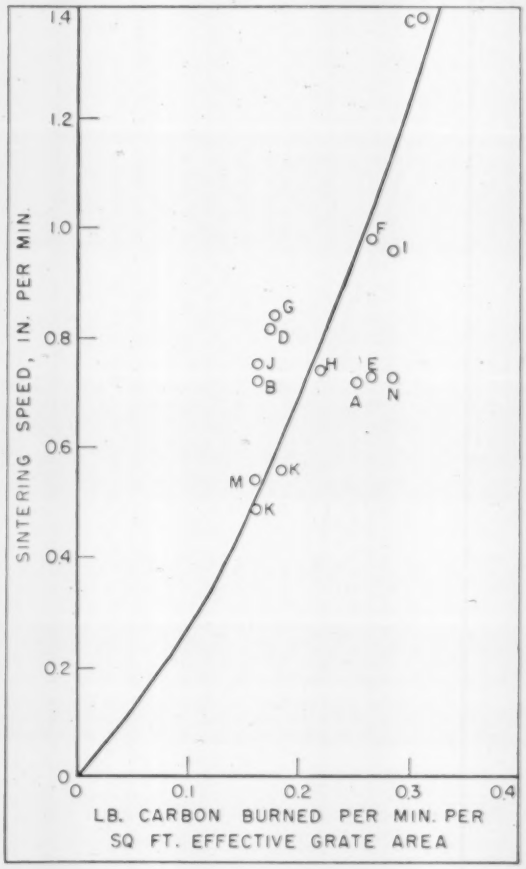
Supplemental fuel is added to the mix at most plants. Two of those surveyed are operating on only the fuel content of flue dust, and two burn the sulphur indigenous in the iron sulphide raw material. Supplemental fuels used are coke breeze, bituminous coal and anthracite coal.

Coke breeze is usually screened, either at the coke plant, furnace stockhouse, or sinter plant, although sump breeze from the quenching pit is used direct.

Size of the supplemental fuels varies from minus 3/64 to minus ⅝-inch, that of coke breeze from minus ⅛ to minus ⅝-inch. Screen analyses plotted on logarithmic-probability paper are shown on p.95.

Largest fuel is the coke breeze used at plant "I", which is nominally minus ¼-inch but which contains actually 21.5 per cent plus ¼-inch. The sinter pro-

This graph shows the relationship of sintering speed to the rate of burning carbon in the plants surveyed



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During the current critical nickel shortage, the same close tolerance and uniformity of gauge that have made MicroRold 18-8 so outstanding are now being incorporated in MicroRold 430.

It is important that the individual end use be discussed with your distributor or with our metallurgical department.

MicroRold 430 has moderate ductility, good forming and bending characteristics, and can be drawn to a *moderate* degree. It can be brazed and soldered with the same facility as chrome-nickel grades and except where resistance to high stresses is a major factor, it welds satisfactorily by the usual methods.

MicroRold 430 is used extensively for interior architectural trim, bar, restaurant and soda fountain components, table tops, etc. Washington Steel Corp. is currently producing polished sheets in standard sizes, 20 gauge and lighter, to replace chrome-nickel material vitally needed for the national defense program.

WASHINGTON STEEL CORPORATION

Washington, Pennsylvania

TABLE II
PRODUCTION RATE
Net tons per 24 hours per sq ft effective grate area

Screened Ore and Low Flue Dust		Screened Ore and High Flue Dust	Fine Ore Concentrates	
2.69	B	2.61	G	2.46
2.11	C	4.08	J	2.10
2.59	D	1.95	L_1	2.01
2.23	F	3.51	L_2	2.91
	H	2.60	M	2.31
			N	3.25

duced is characterized by a network of large pores whose walls are completely slagged over. However, the same structure of sinter is observed at plant "E" where coke ground in a rod mill is used. The large pores at "I" seem to be the result of large coke while those at "E" seem to be the result of large screened ore.

Fuel Size Varies—Size of supplemental fuel should bear some relationship to the size of ore materials in order to ensure adequate mixing and prevent localized hotspots. In the plants surveyed it was found that the average size of fuel varies from one-third to three times that of the mixture before return fines.

Almost all plants are screening ore to a size larger than that desired. Consequently they are depriving the blast furnace of suitable, sized ore while spending unnecessary money to agglomerate it. The preferred size of ore would be $\frac{1}{8}$ or 1/16-inch. The smaller size screen being used for lake ores is $\frac{3}{8}$ x $\frac{3}{4}$-inch; a Gogebic range ore is being screened over this with the very greatest difficulty. For other lake ores sizes range from $\frac{3}{8}$ x 4-inch to 1 x $1\frac{1}{4}$-inch, and the lowest size is used only for dry ore under favorable weather conditions.

However, in plants where screening to a smaller size could be accomplished with a reduction in screening throughout, the operation choice is always to run the sinter plant at full capacity on a coarse ore rather than to curtail production with a finer ore. This reasoning is inconsistent with the complaints about value of the sinter produced, although many economic, labor, and other factors enter into such a decision.

One new method for screening ores to finer sizes is in the experimental stage. This is the electrical heating of screens. A preliminary trial at one plant was successful in screening lake ore to 3/16-inch without blinding the screen.

Because of its variability in carbon and moisture content, the method of handling flue dust, is important when large percentages are used in the sintering mixture. Practice varies greatly, from almost direct transfer of dust from furnaces to sinter plant, to elaborate stockpiling and mixing of dust in the ore yard and in feeding out of storage bins. No clearcut example was found among the plants surveyed of the virtues of one system as compared with another.

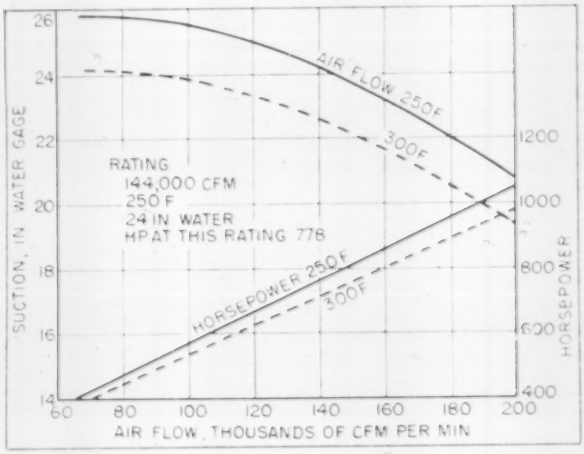
Mixing Devices Utilized—Adequacy of mixing is difficult to analyze. The plants use several different mixing devices, including double-shaft pug mills, single-shaft pug mills, and tumbling barrel "fluffers." Only one plant shows fairly definite evidence of inadequate mixing by an irregular and uneven fire zone at the discharge of the sinter machine. This plant mixes feed to two machines dry in a single-shaft pug mill, splits the feed through two hoppers, and passes each half through a short tumbling barrel having internal flights, where the water is added.

Replacement of pug mill and fluffer paddle blades is an item of frequent maintenance. Life of steel paddle blades with and without surface treatments varies from 1 to $5\frac{3}{4}$ weeks. Ni-hard lasts much longer, 9 to 16 weeks, although its brittleness is a disadvantage.

For distribution of material onto the grate of the machine all the Dwight-Lloyd plants, except one, use a swinging spout. These are of various designs in four general types. When properly adjusted, the swinging spout gives a fairly level bed, but many cases of poor adjustment were observed and the effect could sometimes be traced in the fire zone at discharge.

Two plants operate without the cutoff plate. The result is a very rough surface of the bed which seems soft and probably contributes to return fines.

One departure from the conventional swinging spout is the semicone distributor. This consists of a cone section which fans out the material as it falls



A typical fan performance curve which reveals that rating in cubic feet per minute is not informative unless both the rated temperature and suction conditions are present

over it. It is followed by three baffles and a finger grizzly before material hits the grate.

Enhances Size Segregation—The finger grizzly is a device for checking the fall of material just above the grate. Its effects are to keep a fluffy bed and to enhance size segregation by rolling large material to the grates and causing a gradation of sizes to the very fine on top.

At the Greenawalt plant, mixed feed is screened and the two layers laid onto the grate from separate bins on the charge car. The hearth layer has a particle size of plus $\frac{3}{4}$-inch and is about 1-inch thick as laid down. The screen undersize falls through a fluffer mechanism on the charge car into the pan.

Bulk density of the bed may be used as a rough indication of the effectiveness of various distributing systems. It is not measured directly, but it may be

Portion of a paper presented before the Chicago regional meeting of the American Iron & Steel Institute, 1950.

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BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

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Selling to Department of Defense —Army, Navy and Air Force

The information contained on this page relative to selling to the Military Departments of the Department of Defense was obtained from the Munitions Board Small Business Office.

Manufacturers, faced with material shortages and curtailment of civilian goods, are of necessity seeking defense orders to keep their plants operating. These do not come without effort on the part of the manufacturer.

However, a manufacturer may waste time seeking war orders through trips to Washington. Information, and eventually orders, can be obtained more quickly and easily by writing.

The Department of Defense, under which falls the Army, Navy and Air Force, has assigned to individual military departments responsibility to procure certain supplies and services for all three units.

At the same time the Army, Navy and Air Force have offices which buy for their individual needs.

Get on "Bidders Lists" for Prime Contract Work

All of these offices have what is known as "bidders lists". The manufacturer should be on these lists to receive a chance to bid on a formally advertised contract or to be approached for a negotiated contract.

Wherever possible, the advertised method is used. However, negotiated contracts are permitted under the recently declared national emergency.

The Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., has available three booklets. These publications list the purchasing offices of the Army, Navy and Air Force, and give a brief descriptive list of the items each purchases. The method of getting on "bidders lists" and the necessary steps in seeking contracts are also explained:

1. "How to Sell the U. S. Army" (30 cents).
2. "Purchasing Items and Purchasing Locations of the Department of the Navy" (20 cents).
3. "A Guide for Selling to the U. S. Air Force" (15 cents).

IT'S YOUR JOB!

There is no easy way to do business with the Government. You must exercise just as much initiative, enterprise and salesmanship as you would in doing business with private industry.

Another service is available to manufacturers for information as to the purchasing office to write to for a specific product or products. A letter listing products you are making or can make should be addressed to:

The Military Procurement
Information Office
Munitions Board
The Pentagon
Washington 25, D. C.

Information as to specific offices to contact for getting on bidders lists will be sent to you. This office will also answer questions pertaining to defense orders.

When you have obtained the name and address of the office, or offices, interested in procuring your goods, a simple letter, illustrated on this page, will either put your company's name on the bidders list or bring application blanks.

Daily Listing

As an aid to businessmen in obtaining current information as to what the Government is purchasing, and an opportunity to bid, the U.S. Department of Commerce publishes daily a "Consolidated Synopsis of U.S. Government Procurement Information." It lists the purchasing office making the procurement, the item contemplated and the amount, the invitation for bid number, and the bid opening date. A firm may bid on any item listed by writing to the office doing the buying, giving the IFB number, and requesting a bidding set.

Sub-contract Work

Up to this point only prime contracts have been discussed. There are, however, many concerns who can handle, or desire, only sub-contract work such as screw machine, press, tool shops, etc.

To facilitate small business in obtaining the names of the firms awarded unclassified Department of Defense contracts in amounts over $25,000, the Department of Commerce publishes weekly the "Consolidated Synopsis of Contract Award Information." This gives the name and address of the successful bidder, the commodity purchased, the quantity, and the value.

Both contract award and procurement information synopsis may be reviewed at your local Chamber of Commerce or nearest field office of the U. S. Department of Commerce. If you wish to receive these regularly write to:

U. S. Department of Commerce
Division of Printing Services
Washington 25, D. C.

Suggested Letter Seeking Bids

(Company Letterhead)

Commanding Officer
(Purchasing Office)
(City, State)

Dear Sir:

Our firm is desirous of supplying items centrally procured through your office, as outlined in pamphlet "How to Sell to the United States Army" and/or "Purchasing Items and Purchasing Locations of the Department of the Navy", and/or "A Guide for Selling to the U. S. Air Force".

Attached hereto is a list in duplicate of items which we desire to furnish. Where known, we have also indicated the applicable Government specification.

As we have never before bid on business through your office, we are attaching a copy of our most recent balance sheet, and profit and loss statement.

It is recognized that your office is extremely busy under the impact of procurement necessitated by the present emergency. No formal reply is requested, however, we would like the duplicate list returned to us in the enclosed self-addressed stamped envelope. Please mark any items that are not procured by your office, and if possible indicate the appropriate purchasing office.

Yours truly,

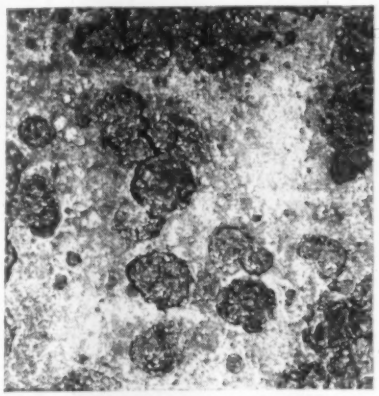
CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

DEZINCIFICATION CORROSION, Cont.

Plug Type

Dezincification of brass (copper-zinc alloys) may occur in highly localized areas (sometimes as small as pinheads) in the form of "plug-type dezincification." If the section of brass can be bent the porous plugs of copper will pop out leaving hemispherical pits. Frequently, the location of the areas of "plug-type dezincification" are readily located through the white, brown, tan, or colored tubercles or caps of zinc-rich salts which form directly over the areas wherein dezincification has occurred.

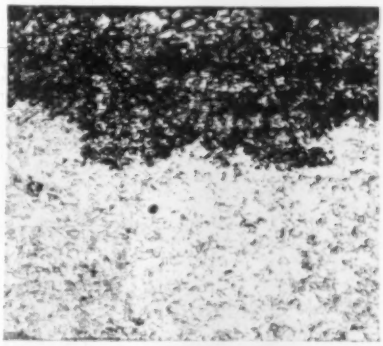


Porous plugs of copper which are deposited in "plug-type dezincification" of non-inhibited aluminum brass tube which was flattened out and photographed. Note overlapping of plugs. Micrograph mag. 10X.

Layer Type

When dezincification covers larger areas, it is known as "layer-type dezincification." After a long period of time relatively thick layers (.003" or more in thickness) may be peeled from the brass leaving an irregular surface. Sometimes "layer-type dezincification" results from a merging together of a large number of small plugs of copper and can be recognized by the rounded nodular appearance of the copper layer which is adjacent to the brass surface.

"Layer-type dezincification" may occur on brass with or without a dezincification inhibitor under conditions

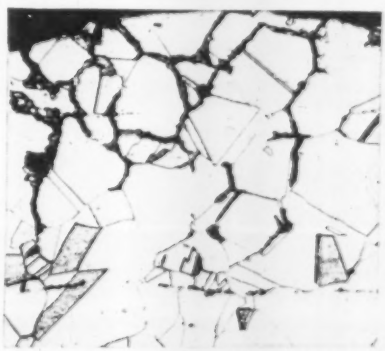


"Layer-type dezincification" is recognized by relatively thick layers of deposited copper built up over a period of time. Micrograph mag. 75X.

where severe general corrosion results in the formation of a thick layer of corrosion products. Decomposition of the copper salts in the corrosion products can occur through reversal of the corrosion cell. When this occurs crystals of copper are deposited which are comparatively large, bright and dense.

Intercrystalline

Dezincification may occur preferentially along the grain boundaries. This may weaken the metal due to the brittleness of the intercrystalline deposit of copper and poor adhesion to the surfaces of the grains of brass.



Intercrystalline dezincification along grain boundaries. Micrograph mag. 250X.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Roll Type Tube Expanding Tool has electronic drive control which limits action of the expander independent of variation in tube-wall thickness or in tube-hole diameter so expanding forces will not exceed safe limits for the tube metal. Operation is on 110-volt, 60 cycle ac. or dc. Unit includes shelf-equipped hand truck to carry spare tools and accessory parts as well as control housing. **No. 1122**

Revolving Turret Head Adapter affords three-position indexing to simplify basic set-ups on turret lathes or hand screw machines. Spot facing, drilling, counterboring, reaming, tapping and other tools are said to be easily adapted, while stop, center and chamfer set-ups can be left in machine permanently. Adapter is available in 1, 1¼ and 1½-in. straight shank and in Morse taper shank sizes. **No. 1123**

Tube Bending Machine, powered by pneumatic cylinders, uses fully automatic die and clamping head. As many as 10 bends can reportedly be made in single tube of any diameter up to 1¼". Interchangeable dies and guide rolls with radii up to 9½" can be employed to handle various sizes of round, square and rectangular tubing in lengths from 6" to 10'. Adjustable stops can be set to position bends and facilitate production work. Normal compressed air requirement is 80 psi. **No. 1124**

High Pressure Switch may be used for pressures as low as 3 psi and is said to withstand up to 3000 psi. The totally enclosed, explosion resistant switch may be used with water, air, oil, kerosene, gasoline, etc. It is arranged for panel mounting but may be mounted in any position. Electrical circuit consists of switch, 15 amps, 125 volts ac. resistance load. **No. 1125**

Stapling Hammer reportedly facilitates application of roofing, siding, freight car lining and similar materials. The self-feeding tool drives home ¾" galvanized staple with one follow-through blow. Staple legs diverge inside work, putting them under tension. Tool weighs 2¼ lbs. with full load of 50 staples. **No. 1126**

Punch Press Stock Feed handles strip up to 8" wide, feeds up to 24" of stock accurately within 0.003 to 0.005". The hydraulically actuated device can be used on almost any punch press. Actuated by press ram, unit is said to have sufficient power to pull stock through roll straightener which is integral part of device. It can be located on bolster to feed from left, right, front or back. All moving parts operate in oil. **No. 1127**

Two-Spindle Bolt Threader can cut either right or left hand threads in milled, upset or forged parts. Spindles are driven through V-belts and change gears by 2-hp 1200 rpm motor located in base. 6" long threads can be cut on blanks up to 24" long. Maximum capacity is 1" diameter straight threads and ¾" taper pipe threads. Adjustable stop automatically trips machine when proper length of thread is cut. **No. 1128**

(6298)

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Most users of Stainless-Clad steel know the 20-year record of IngAclad. Countless applications in all of the Process Industries have proved its dependability and real economy. Where protection has been needed on *both* sides of the metal, Ingersoll solid stainless sheets have also had wide acceptance.

But do you know that Ingersoll heat-resisting steels have also made an outstanding record in such applications as furnaces, ovens, etc., where excessively high temperatures are applied?

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Plants: Chicago, Illinois; New Castle, Indiana; Kalamazoo, Michigan

recalculated from production data since the cutoff plate functions as a weir. The chief item of doubtful accuracy in such calculations is the percentage of return fines.

The ignition burner is one piece of equipment which is different at all plants. Designs are all individual, but they fall into two classes, the arch furnace-type and the torch-type. The arch furnace is a large refractory arch covering a substantial length of bed. Time of flame exposure to the bed is relatively long. The torch is a single row of nozzles or a single slot extending across the bed. Time of exposure to flame is relatively short.

On the basis of heat released by fuel to a square foot of bed the torch type is more economical, and it seems to do a very satisfactory job.

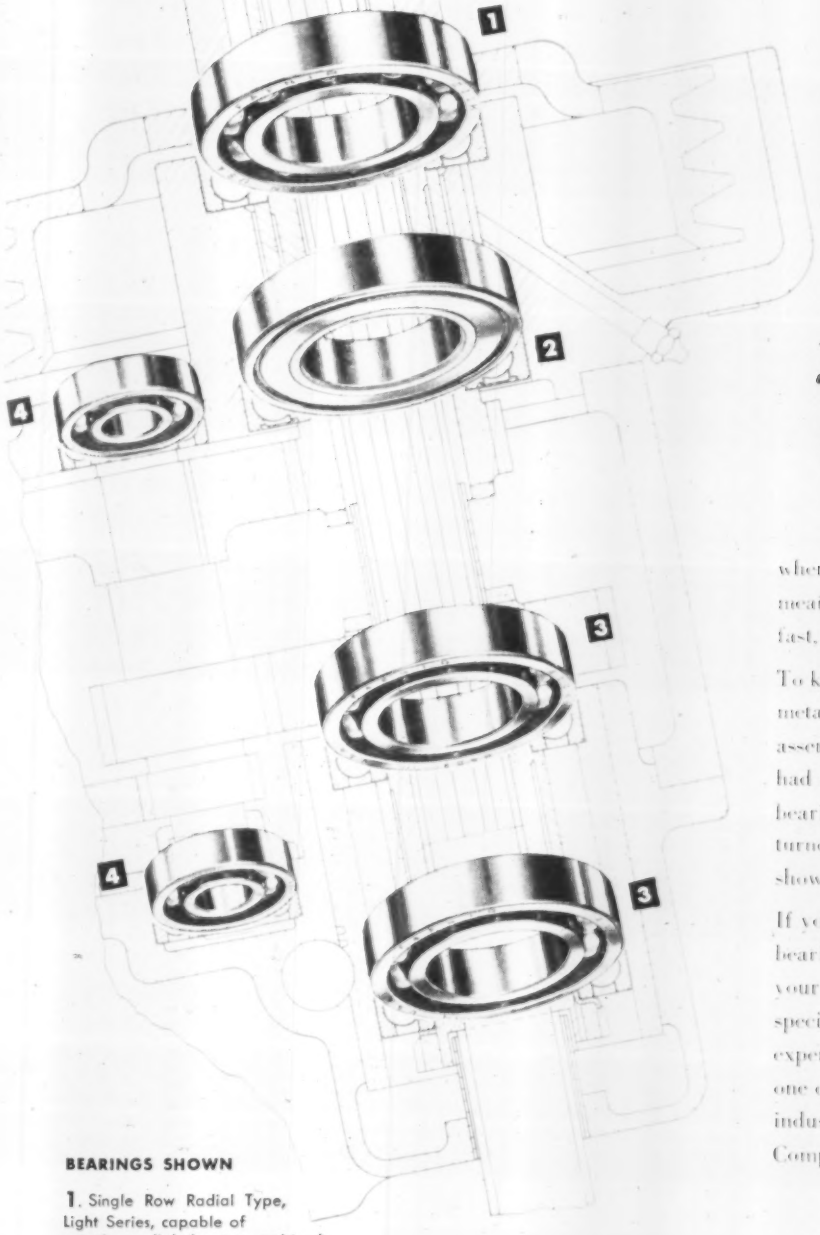
One operating difficulty, which seems to be traceable to arch furnace burners, is the cracking and warping of side plates as the flames lap over them. This condition is so far advanced at one plant that each sideplate is cracked down the middle and worn on the edges; hollow spots are formed in the bed behind each opening as the air pulls material through the grates.

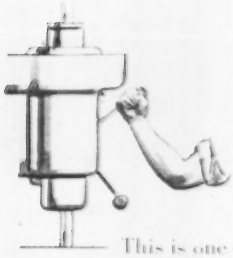
Fuel Control by Observation—Ignition fuels used are blast furnace gas, coke oven gas, mixed coke oven and natural gas, natural gas, and fuel oil. Heating value of fuel used per ton of sinter varies from 31,000 to 195,000 Btu, with an average of 100,000 Btu. Amount of fuel used at each plant is controlled entirely by observation, usually at some point below that which would slag the bed surface. There seems to be a tendency to use more heat for ignition the higher the heating value of the fuel.

The completeness and uniformity of bed burning varies widely from plant to plant. Practice covers the whole range from nonuniform to uniform and from incomplete to complete. Only one plant makes a deliberate practice of incomplete burning, for the stated reason that leaving a little unburned material on the grates improves the production rate. This plant has by far the best record of grate bar life. Nonuniformity of burning is usually the rule at most plants. Even the better plants in this respect suffer not infrequent periods of poor burning. These observations indicate an unstable process which produces sinter product of inherently varying quality. That this should be the general situation in a number of the most modern sintering plants points up a need for improved means of control.

Among many factors influencing

a stroke... a hole





This is one case where a stroke a hole does not mean a handicap. Instead, it means fast, uninterrupted drilling.

To keep up such a pace in any metal, the maker of this power feed assembly for a drill press knew he had a tough holding job for ball bearings . . . a problem which he turned over to Fafnir. The solution — shown here — worked perfectly.

If your product calls for ball bearings you, too, will find it to your advantage to call in Fafnir specialists because Fafnir's experience is not limited to just one or two industries but is industry-wide. The Fafnir Bearing Company, New Britain, Conn.

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1. Single Row Radial Type, Light Series, capable of carrying radial, thrust or combined loads in any direction.

2. Same as above with single grease shield added.

3. Same as No. 1 except the size of bore.

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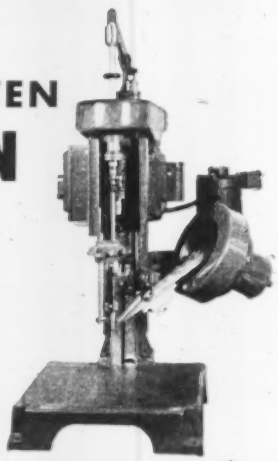
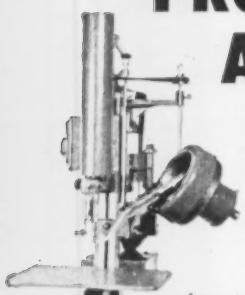
PRODUCTION AIDS . . .





Now, more than ever, speed in production is the order of the day . . . That's why these popular D.P.S. power-driven machines prove a greater-than-ever contribution to present-day industrial needs.

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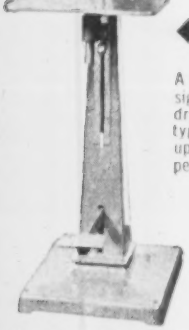

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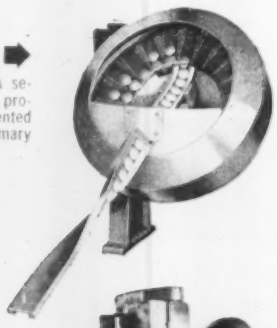

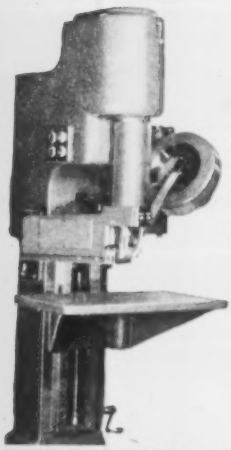

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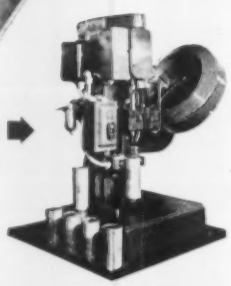

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burning of a sinter bed, the most important seem to be mixing, ignition, permeability, air velocity, carbon and moisture contents, depth and machine speed. A number of these have already been discussed.

Moisture Analysis Important. Closest moisture control observed was at the Greenawalt plant where this is held to be a critical operating feature. Moisture analyses are made every half hour on magnetite, coal and prepared feed in the pans, also every 15 minutes on mixture from the pug mill. A rotameter aids in controlling water addition.

Carbon content of feed at the plants has a surprisingly narrow range of 4.4 to 6.7 per cent in mixture without return fines, and 3.2 to 4.8 per cent in mixture with return fines. This refers to average conditions, and does not concern great variations which take place every few minutes or over a period of hours. It is interesting to note that the plant which makes about the hardest sinter has only 3.8 per cent carbon in mixture with returns, a value which is not nearly so high as at some other plants.

When the comparison is made on the basis of heating value of the fuel, the figures for the two plants sintering iron sulphide are just marginally lower than those for plants sintering oxide ores.

Vertical speed of sintering, or rate of travel of the fire zone, referring to p. 97, is found to increase as expected with the pounds of carbon actually burned per minute per square foot effective grate area. This vertical speed determines what bed depth and machine speed to use. Various combinations of these may be employed. The minimum thickness of bed seems to be determined by the fan motor horsepower capacity, since the thinner the bed—the lower the suction and consequently the higher the air drawn by the fan.

Comparisons of air from plant to plant are very unsatisfactory. Air is directly measured at only one plant, where a flowmeter is used on sinter gas at the discharge side of the fan following water scrubbers. At other plants it must be evaluated from the fan-rating, the suction, and the motor electrical input.

The fan (graphed on page 99) is rated at 100,000 cfm, 250° F and 24-inch water suction. It could also be rated at 131,000 cfm, 250° F and 20-inch water suction. Departure from rated conditions in actual operation is found to be large. Therefore it is hazardous to make comparisons on the basis of fan ratings. Furthermore the motor is sometimes intentionally

ove size, so that a comparison of its rated and operating amperes against the fan rating in cubic feet per minute is not satisfactory.

Air Comparison Possible—A rough comparison of actual air is possible in terms of utilized horsepower per square foot effective grate area, where the per cent utilization is the ratio of actual to rated motor amperes. When this is divided by the pounds carbon burned per minute the resulting value is a relative measure of the air used per pound carbon burned. The highest of these values is found at the plant where sinter is burned through and cooled on the last five windboxes of the machine.

Life of fan impellers varies greatly. In Dwight-Lloyd plants it is six months to over eight years. The differences are not all explainable. Contributing factors seem to be size of the dust settling chamber, action of the dust collectors, and condition of grate bars and sideplates.

Only equipment in use for screening sinter is the stationary grizzly screen. Most of these have only a single deck. In screening efficiency all of them, with the possible exception of one double deck screen, rate fair to very poor.

Screening of sinter appears to be an area where changes in plant design could effect major improvements in product, production rate and economies of operation. The grizzly screens are the source of a large amount of fines in sinter product. They are also the cause of unnecessary recycling of much large sinter.

One plant uses replaceable sections of grizzly screen having various spacings for changing the amount of returns. A bed surface plow or rake is used at a few plants. It digs up the surface to a desired degree. It seems to be an effective means of aiding in the control of amount of returns and it tends to lower the average size of returns.

Amount of Return Fines Variable—Only a few plants make regular measurement of the amount of return fines in the mixture. At some this is impossible even on a test basis. Amount of returns is a variable quantity at all plants. In view of these facts and the importance of return fines to bed burning it seems that means of measurement and control of size and amount should yield improvements in operation.

Water quenching has always been pointed out as one of the chief causes for breakdown of sinter into fine sizes. Without doubt it is an important one. However, many plants tend to use water sparingly. Much so-called water-quenched sinter is actually air cooled because of the action of sprays. Some plants drench

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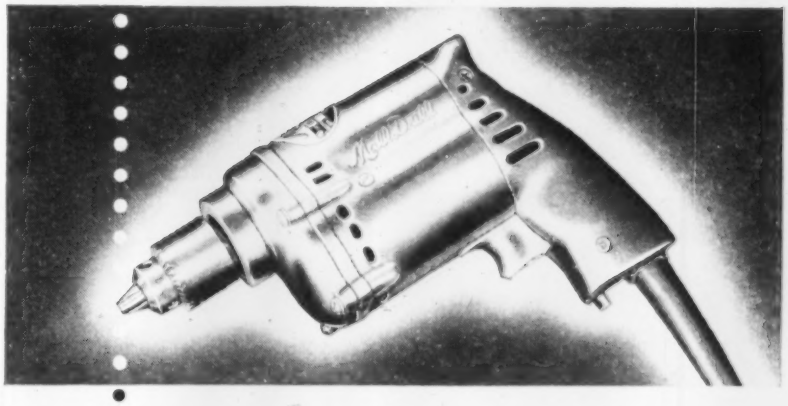

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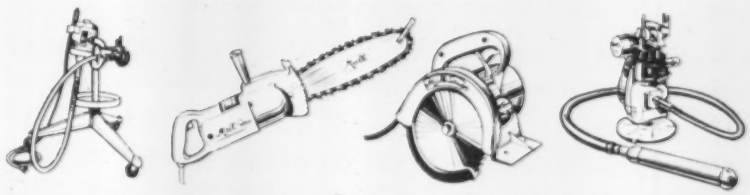

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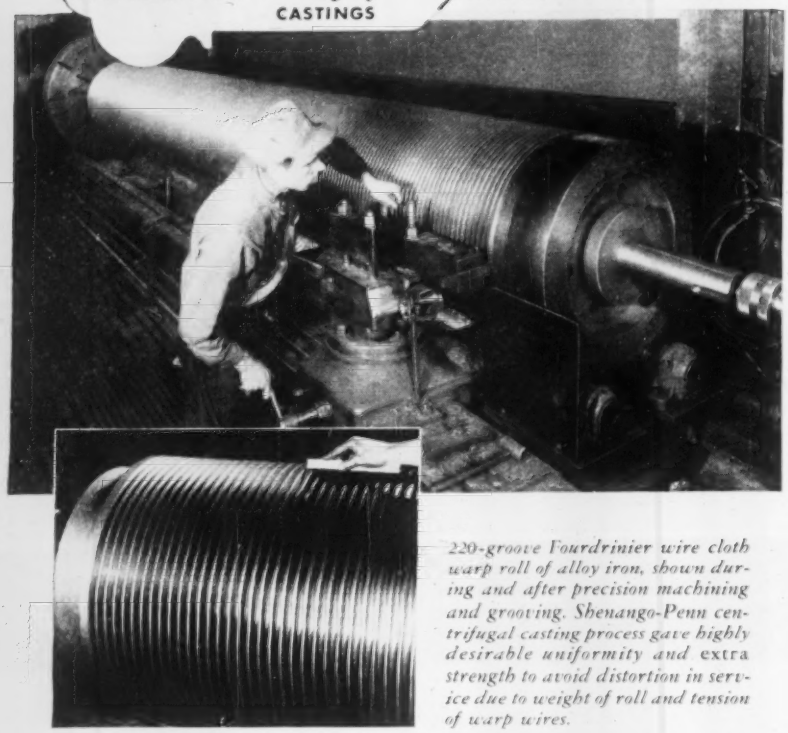

220-groove Fourdrinier wire cloth warp roll of alloy iron, shown during and after precision machining and grooving. Shenango-Penn centrifugal casting process gave highly desirable uniformity and extra strength to avoid distortion in service due to weight of roll and tension of warp wires.

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The big special roll shown and described above is one of the many varieties made by Shenango-Penn. For bulletins, for specific data on rolls or roll assemblies of *any* size or type, ferrous or non-ferrous, write to . . .

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the sinter, while others use only small sprays over the pile at discharge. Curtain sprays are used effectively along the inside edges of cars which load sinter directly for shipment. This keeps the car from burning.

A system of air cooling is used at one plant. Sinter is burned through on the eleventh windbox of a 16-windbox machine, and is cooled until black as it passes over the end of the machine. At a temperature of 400 to 500° F it drops onto a large rotary cooling table where it stays for two hours until cooled to about 200° F. It is plowed off onto a belt conveyor and tripped onto an outdoor storage pile. The handling is particularly gentle. From this storage pile it is recovered by underground conveyor and belt transported to furnace bins.

Double-Deck Grizzly Screen Efficient—Combined effects of quenching and handling shown in Table I are those which may be expected. The plant with air cooling and gentle handling has the largest sinter and the lowest fines at the blast furnace. Plants having both severe quenching and handling have the smallest sinter and the highest fines. The other plants having moderate quenching and handling fall intermediate. The only exception seems to be plant "B"; it has large sinter and low fines but severe quenching and handling. A possible explanation is the greater efficiency of the double deck grizzly screen.

Many plants are willing to agree that too much emphasis has been placed on production at the expense of sinter quality. Plant "C" has achieved remarkable production for its size, Table II, but results in the blast furnace are indifferent and sinter appearance indicates that much quality improvement is possible. Therefore a high production rate may not be the sign of a superior operation. Plants sintering ore and flue dust have rates of 1.95 to 4.08 net tons.

Very little concrete information is available on the removal of dust from stack gases. Within the plant, chief sources of dust are the discharge end of the sinter machine and points where hot return fines and dry dust are dropped onto the mixture belt. Improvement of dust conditions at the discharge end of the machine is particularly important because the operator gets one of his chief operating aids from watching the cakes of sinter discharge. Cleaning up at this point should aid many plants in improving uniformity. The most effective arrangement observed was a very large discharge hood extending upward full size to form the stack.

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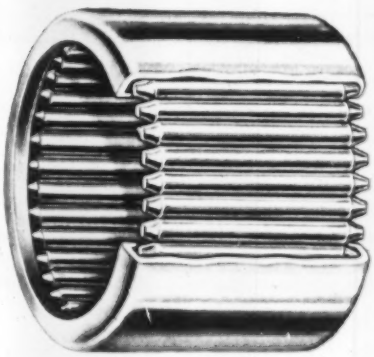

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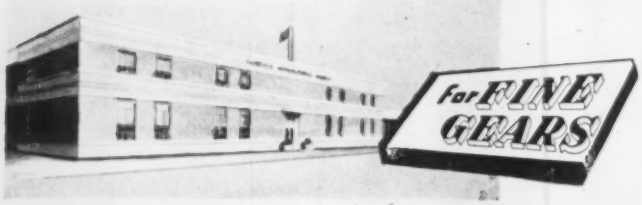

"Hydraulic Assist" Gear

(*Concluded from Page 92*)

slightest reversal of torque.

Valve Functions—Two valves are used for each power cylinder, one called the *distributor* directs oil to the proper cylinder, the other called the *reaction* valve does two things. Controls the oil flow and pressure and regulates the ratio between manual and hydraulic torque.

Power Cylinders—Drawn steel power cylinders are screwed into the steering gear housing and locked in place with spanner nuts. The piston heads are joined together with a yoke that assures their proper alignment at all times. Pistons have adequate clearance and are sealed by a unique composite piston ring. This consists of a T-shaped synthetic rubber ring backed up on either side by split laminated phenolic plastic rings. These rings prevent destruction of the rubber ring by extrusion as would be the case if ordinary O-rings were used. The high pressure oil lines are attached to the cylinder head by banjo-type connectors, sealed with O-rings.

The power steering arm against which the power pistons operate, is slipped over the steering arm shaft and held in position by a set screw and jam nut. Note that it has a series of broached splines on the side opposite the clamping screw. They cover about 90 degrees included angle and, therefore, are not under cut at any point. This was done to get full bearing of all splines and make it impossible to misassemble the parts.

A hardened steel roller takes the hydraulic piston thrust. Needle bearings between the roller and the pin which is carried in the fork of the power arm assures smooth operation of the roller. This is necessary because the hardened steel thrust pins which press against it travel on the centerline of the power cylinders while the roller moves in an arc. The cap screws which secure the piston head to the connecting yoke are locked in place by a spring ring. Any leakage past the piston rings is inconsequential since the entire rocker arm chamber is filled with low-pressure oil. The ends of the steering arm shaft are sealed to retain this oil.

With the design, it is possible to use a much lower overall steering gear ratio and not sacrifice easy handling at low speeds or when parking. To begin re-educating drivers to the greater safety of low gears the first Hydraguide will have about 16 to 1 ratio although experimental cars are being driven successfully and safely with as low as 9 to 1 ratio.

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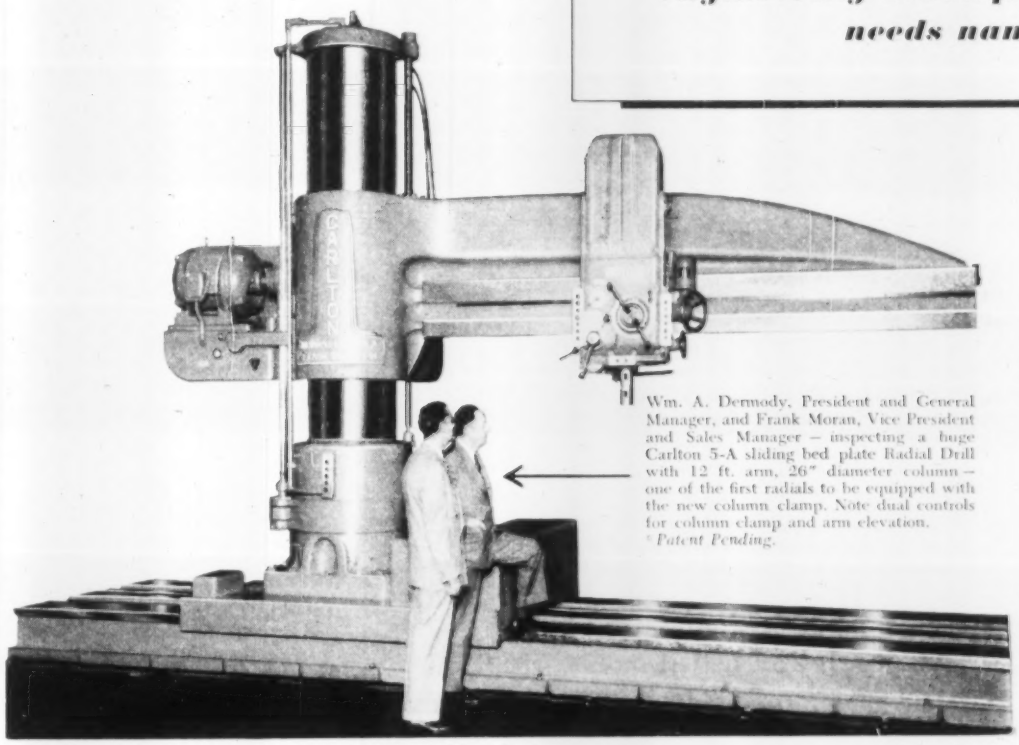
Carlton column clamp name contest*

. . . latest Carlton engineering development needs name!



Wm. A. Dermody, President and General Manager, and Frank Moran, Vice President and Sales Manager — inspecting a huge Carlton 5-A sliding bed plate Radial Drill with 12 ft. arm, 26" diameter column — one of the first radials to be equipped with the new column clamp. Note dual controls for column clamp and arm elevation.
* *Patent Pending.*

The Carlton Column Clamp,* revolutionary new development contributing to more rigidity and greater accuracy in radial drilling, needs a name but quick. You can have yourself a lot of fun—and at the same time help us—by entering this novel contest. And if you submit *the winning name, you'll be $500 richer!* Furthermore, your Carlton distributor salesman will be awarded a $100 bonus—so count on him for lots of help.

Even though you don't win the grand prize of $500 cash, you may qualify for one of the many valuable honorable mention merchandise prizes which are worth $500 in the aggregate.

Contest Rules are Simple . . . send for them today. Fill in the coupon below and you'll also receive your official entry blank and the Power Clamping bulletin that tells you all about Carlton's sensational new column clamp.

Don't delay . . . contest closes midnight, March 31, 1951.

Fill in and mail coupon today!

Contest Committee

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

Gentlemen: I'll think up a good name for your new Column Clamp.* Send me immediately (1) contest rules and official entry blank and (2) Power Clamping Bulletin describing the column clamp.

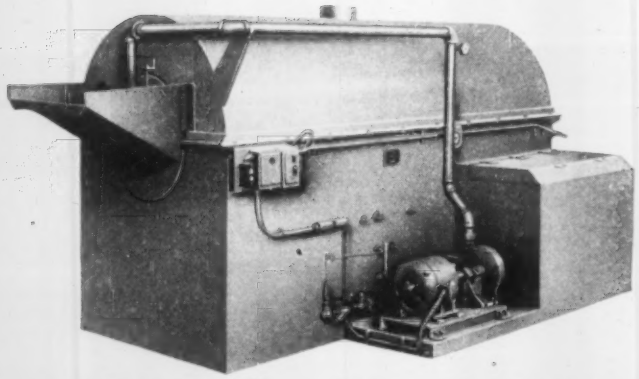
NAME _____

COMPANY _____ TITLE _____

CITY _____ STATE _____

UNIVERSITY OF MICHIGAN LIBRARIES

SMALL PARTS TUMBLED CLEAN



in this new DETREX ROTARY DRUM WASHER

Parts to be cleaned go into the hopper at one end of this new Detrex washer. A few minutes later they pour out of a chute and into a tote pan at the other end, clean and ready for the next production step.

In this short time, the parts are soaked, sprayed with cleaning solution, and drained—all the while traveling forward through the rotary drum.

Compact, entirely self-contained, the new Detrex rotary drum washer is economically priced, and is sturdily built to last. The charging box, spray nozzles, drive mechanism, and other working parts are readily accessible and maintenance is negligible.

Other models available incorporate multiple stages of spray wash, rinse, and hot dryoff.

Write today for complete information on Detrex metal parts washers.

DETREX DETROIT MICH.

DETREX Corporation

BOX 501, DETROIT 32, MICH.

Tiny "Voices" From Rolled Zinc

One of the smallest of the reed "instruments" is the sound unit, only 1 inch long and weighing about 1/10-ounce, used by the millions in talking dolls and in rubber toys.

These tiny noise-makers rely on several properties of rolled zinc, the metal used not only in the tube which forms the body of the device but also in the protective sleeve into which the tube is fitted.

Vibrating member in these zinc tubes is a brass reed whose thickness —only 0.002-inch—permits it to vibrate clearly and audibly in the slight flow of air developed when, for example, a doll is tipped or a rubber toy squeezed. In the design developed by Wintriss Inc., New York, this reed is mounted on the zinc tube, and vibrates directly against it. Therefore, the nonresonant property of zinc is required.

Tubes and sleeves are stamped from strip zinc 0.018-inch thick. The tube is formed to a cylindrical section for about ¼-inch of its length, and the remainder is stamped to semicylindrical shape. Small lips on each side of the brass reed are formed to radii which are slid over the flat section of the zinc tube and grip its sides, preventing displacement and holding one end of the reed sufficiently tight so that the remainder can vibrate with the desired frequency.

Two small ridges formed near one end of the zinc sleeve keep the tube and reed securely in position when assembled. Stamping operations are performed with multistation dies in high-speed automatic presses.

Honing "Package" Offered

Honing machines, covering diameters ranging from ¼ to 30 inches, honing tools and fixtures—everything needed to do a complete honing job—are all being supplied by C. Allen Fulmer Co., Cincinnati. Advantage to the customer is that one source is responsible for the efficiency of the honing operation, the company says.

Vertical spindle honing machines in 14 models are offered by the manufacturer. They can be supplied with cylinder holding fixtures of the tilting type, hydraulic or air locking, automatic or plain indexing, to suit the customer's job requirements.

Completing the package Fulmer supplies Alexander Ball honing tools in sizes to 50 inches. These tools are the mechanically expanded type with diametrical sizing stops. Many tool sizes are available with removable flanges in which the same stone hold-

IN STOCK NEAR YOU

WEST HARTFORD

THE PRECISION CUTTING TOOLS YOU NEED

— QUICKLY OBTAINED FROM NEARBY STOCK AT

PRATT & WHITNEY

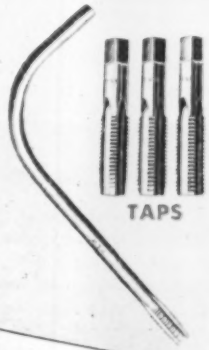
BRANCH OFFICES AT

Birmingham* • Boston • Chicago • Cincinnati • Cleveland
Dallas (The Stanco Co.) • Detroit • Houston (The Stanco Co.) • Los Angeles
New York • Philadelphia • Pittsburgh • Rochester • St. Louis
San Francisco • and from large factory stock at West Hartford, Conn.
Export Department: West Hartford, Conn. *Office only

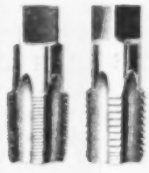
MILLING CUTTERS

END MILLING, DIE SINKING AND KELLERING CUTTERS

DIES



TAPS



There's no better-paying investment than the right tools for the job—P&W *Precision* Cutting Tools. A request on your business stationery will bring you the 444-page hard cover P&W Small Tools Catalog with complete listings and full information.

REAMERS

COUNTER BORES

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

IT PAYS TO BUY
CUTTING TOOLS
ON A PERFORMANCE BASIS

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KRANE KAR Loads and Unloads freight cars, trucks, trailers; Stores materials; expedites Plant Maintenance. Often cuts cost of handling loads to 8c a ton.

No Mobile Crane made today can match **KRANE KAR** speed, safety, and economy of operation... picking up, carrying, and placing loads . . . anywhere, in plant or yard . . . uneven terrain, congested areas, low overhead, up and down ramps.

KRANE KAR

MOVES LOADS EASIER - FASTER - SLASHES COST OF MATERIALS HANDLING

Gas or Diesel. Pneumatic or solid rubber tires; 9 to 37 ft. booms or adjustable telescopic booms; Electric magnet, clamshell bucket, and other accessories available. *Ask for illustrated Bulletin No. 79.*

USERS: General Motors, Bethlehem Steel, Boeing, Pullman-Standard, Lima Locomotive, Carnegie-Illinois, U. S. Steel, Basic Magnesium, etc.

KRANE KAR handles loads at Sides as well as at Front.

THE ORIGINAL SWING-BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

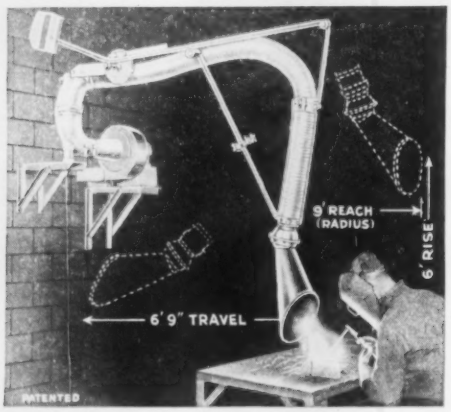
1¼, 2½, 5, AND 10 TON CAPACITIES

KRANE KAR

SILENT HOIST & CRANE CO., 849 63rd ST., BROOKLYN 20, N.Y.

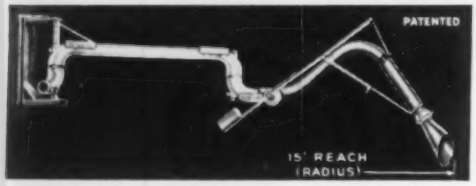
RUEMELIN Fume Collectors

Welding without ventilation. Note smoke and gas clouds.



(Right) Welding with Ruemelin Fume Collector.

REMOVE WELDING FUMES at the Source!



Ruemelin Fume Collectors remove smoke, gas and welding heat. Keep the shop air clean. Efficient and practical. Maximum coverage in welding areas. Your welders work better with this equipment in use. Write for bulletin 37-D describing all models.

Long reach collector extends working range of hood to 15 ft. or 18 ft. operating radius. Double swivel permits hood to work in 360° circle for full coverage.

RUEMELIN MFG. CO.

Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT

3882 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A 5896-3/3

ers and hone body are used. By substituting flanges of different diameters and using the original hone holders, one tool can be used to hone a wide range of bore sizes.

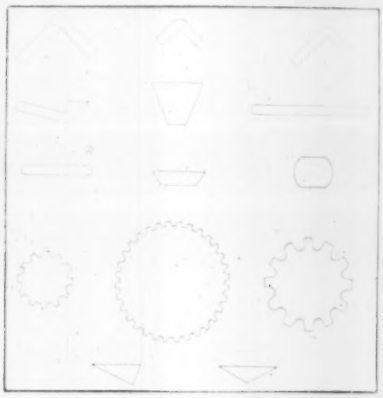
Tips for Carbide Users Released

How to select and apply carbide tools and parts features the 60-page catalog issued by Carboloy Co. Inc., Detroit. It not only contains all data in former catalogs and their various supplements but also many items not previously carried in stock are added.

Not only are tools, etc., listed but information as to selection and application is included. Standard tool and blank sections runs more than 30 pages and includes information as to most suitable uses of each type plus illustrations. Differences and even the limitations in the various carbide grades are clarified, not only for the tool grades but also for the wear-resistant grades.

A striking feature of the catalog is the evidence of rapid development in non-tool uses for carbide. Some applications included are: Tubing and other special shaped lengths in various sizes, more sizes of rectangular strips, solid guide bushings as used in the wire and other industries, seven sizes of carbide check valves and expanded lines of gage blanks.

Sections Eliminate Machining



EXPECTED to minimize or virtually eliminate machining operations in the quality-production of steel component parts is the announcement of steel bar stock cold drawn in special sections to fit specific uses. Available from A. Milne & Co., New York, the preshaped steels are available in a wide variety of sections and in analyses suitable to many applications. Types of steel now available in preshaped form include various standard SAE and AISI carbon steels, case hardening steel, standard mild steels and free cutting steels, in the above shapes

Power Brushing Admits Light

GRIMY WINDOWS that won't come clean with soap and water or even acids can be handled by power brushing, says Osborn Mfg. Co., Cleveland. Osborn brushes using 0.016 wire fill and mounted on portable tools operating at 3450 rpm or more will do the trick. Brushes range from 1½ inches in diameter to 6 inches depending on window frame size

Plastic Lenses Have Longer Life

Plastic cover lenses that last up to 125 days under ordinary usage are being made by American Industrial Safety Equipment Co., Cleveland.

They have been designated as Duralite lenses by the manufacturer and fit all helmets and goggles. Some characteristics are: Freedom from pitting because sparks are repelled from the material, resistance to heat up to 300° F, no warping or softening at high temperatures, freedom from discoloration, high resistance to scratching and optical characteristics comparable to plate glass.

Gages and Their Uses Described

Gaging information useful to metalworking companies is contained in the fixed gage catalog issued by Sheffield Corp., Dayton, O. Purchasings agents, tool supervisors, chief inspectors and others holding similar positions may secure a copy by submitting requests on company letterheads.

A section on purposes of industrial gages and gaging policies contains helpful hints on how to gage, when to gage and what types of gaging are known to be best suited to particular tasks.

Also contained in the catalog are suggestions on care, control and use of gages. A section on thread gaging gives a history and explanation of

Michigan
Electric Resistance
WELDED
STEEL
TUBING

ROUND
3/8" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

Can be Bent,
FLANGED, EXPANDED, TAPERED, DEPRESS BEADED, EXPAND BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET, SPUN CLOSED, FORGED, BEVEL FLANGED, FLATTENED, SWAGED, FLUTED.

Uniform
STRENGTH, WEIGHT, DUCTILITY, MACHINABILITY, WELDABILITY, I.D. and O.D.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

Thousands of products today—from the smallest "Gadget" to the largest—earn more profits because of the use of MICHIGAN WELDED STEEL TUBING. The quality and dependability of MICHIGAN TUBING make possible similar profits for manufacturers who have not as yet considered the design and fabrication advantages of welded steel tubing.

A Quality Product,
can be worked in your plant or prefabricated by MICHIGAN.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.
33 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

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is

overloaded wiring

breaking

your

production

chain?

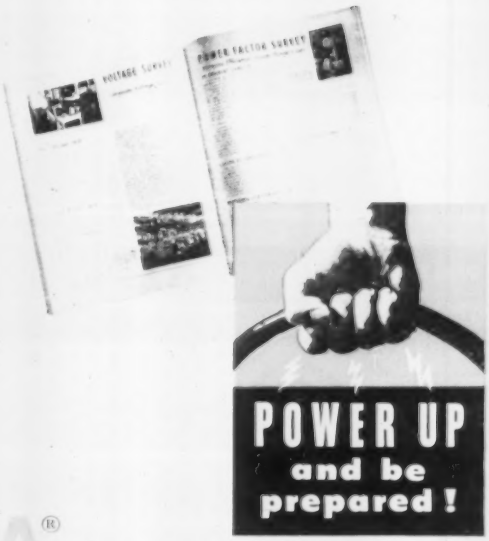
Your plant wiring may be the weak link in your production chain.

When the voltage drops at your machines, those machines slow down—and so does their production! This is happening in 9 out of 10 industrial plants—all because they're equipped with obsolete, inadequate wiring systems.

You're paying for power – make sure you make full use of what you pay for. A *modern* plant wiring system delivers to the machine the power you pay for at the meter . . . and guards you against costly power loss.

Today more than ever full-scale production is vitally important to our national defense. Strong national defense requires full production . . . and full production requires an adequate wiring system. Call your plant, utility or consulting engineer or your electrical contractor today and make arrangements to have him survey your wiring system.

Most important of all, send for your free copy of "*Power Up—And Be Prepared.*" This complete modern wiring guide shows you how you can determine quickly and easily the exact condition of your plant wiring system. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.



the right cable for the job

ANACONDA®

WIRE AND CABLE

UNIVERSITY OF ILLINOIS LIBRARIES

the unified screw thread standards and an explanation of thread gaging terminology. Conversion tables and tables of constants for a 5-inch sine bar are also included.

Firebrick Muffles Jet Roar

Roar in J-47 jet engine test cells is being muffled by General Electric Co. at its Lockland, O., plant by using Babcock & Wilcox insulating firebrick in exhaust stacks. Noise made by exhaust gases from the engines, forced out of the stacks at a velocity of 275 to 340 miles per hour, without sound treatment would be extremely objectionable. With the insulating firebrick used acoustically the sound is so reduced that at a point a short distance from the plant it is no louder than a noisy office.

Cells are those used during the war for testing propeller-type engines and are somewhat smaller than the space usually allowed for jet engine testing. Chambers are about 80 feet long and 20 feet wide. From a side view they appear U-shaped with a 20-foot ceiling rising to 45 feet at each end. Air for combustion of the fuel is admitted through one of these ends and is ejected along with exhaust gases from the engine through a steel pipe that runs part of the length of the cell and makes a right angle bend to go up 20 feet into the exhaust stack.

Height of the exhaust stack is 50 feet with an inside diameter of 6½ feet. Lining is B&W K 26 insulating firebrick 4½ inches thick. Material was chosen for its insulating and acoustical properties combined with ability to withstand heat up to 900° F.

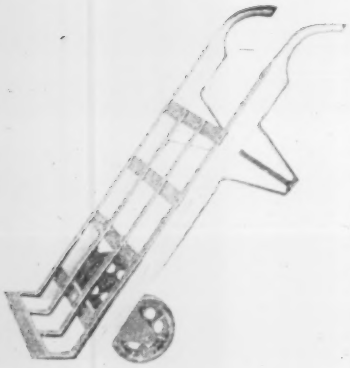
Either a Base or Protector

An aluminum finishing material either as a base for paint or to protect bare metal from corrosion is announced by Chemclean Products Corp., New York. It is called Protecto-Cote and is provided already mixed, and needs only to be dissolved in water at 6 ounces per gallon.

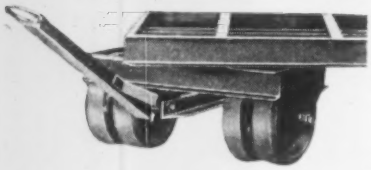
Work is immersed in the solution at 185° F, remaining in the bath about 5 minutes. No electric current is required. Equipment consists only of steel tanks with facilities for heating. The solution is self-cleaning, making the process a one man operation.

Fluid Flow Data Presented

A technical report originally prepared for company staff engineers is now being offered by Fischer & Porter Co., Hatboro, Pa. It contains comprehensive data on the newest technical developments on fluid flow



Trucks and Trailers



up to 50 ton capacity

Built with 80 years of skill by pioneers in the industry. Over a hundred standard two, four, and fifth wheel trucks and trailers. Special units designed and built to your specification. Complete engineering service.

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THE KILBOURNE & JACOBS MFG. CO.

792 Congress St., Columbus 16, O.

EFFICIENT PICKLING WITH Rodine®

PICKLING ACID INHIBITORS

SAVES ACID

SAVES STEEL

SAVES MONEY

Use "RODINE" for improved pickling and increased production!

"RODINE" meets Government Specification No. U.S.N. 51-I-2.

STANDARD PICKLING PRACTICE THE WORLD AROUND

CHEMICALS ACP PROCESSES

For Improved Drawing and Cold Forming . . .

"Granodraw" forms on pickled surfaces a tightly bound adherent, zinc-iron phosphate coating which facilitates the cold extrusion of steel, improves drawing, and lengthens die life.

"Cuprodine" coats both carbon and stainless steels with a thin, bright, adherent layer of copper. This coating prolongs die life and improves the drawing of wire, rod and tubing.

Write for Descriptive Folder

American Chemical Paint Co.

AMBLER ACP PENNA.

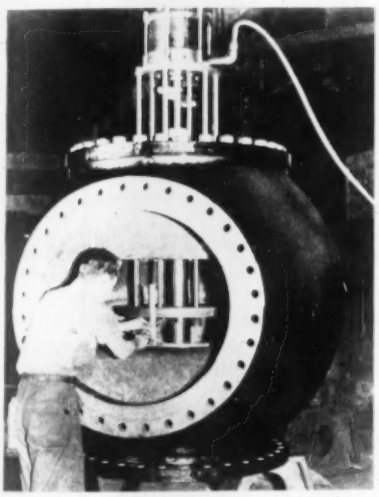
rate testing for the aviation industry in particular. A complete discussion of engineering principles as well as detailed flow curves and charts are features of the report. In addition, it describes the newest calibration techniques and illustrates modern precision accuracy calibration panels.

Finishing Service Offered

Increasing demand for high durability finishes on hundreds of industrial products and equipment parts results in the setting up of a new development service to provide corrosion and abrasion resistant finishes by Erie Enameling Co., Erie, Pa. Among products currently being finished in special types of industrial porcelain enamel are: Exhaust mufflers, furnace saggers, pickling and heat treating equipment parts, conveyor buckets and idler rollers, chutes and pump parts.

Characteristics of porcelain enamel that adapt it to these jobs are that acid resistance is readily obtained and the product is normally highly resistant to abrasion, offers a low

Fast Closers Despite Huge Size



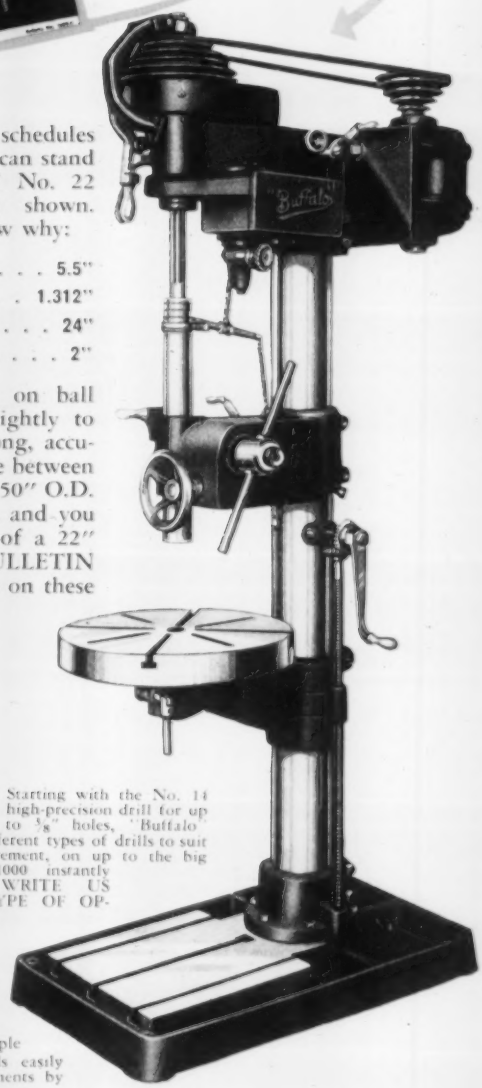
FULL OPENING and closing within one second with absolutely tight shut-off is a must for the giant double-ported control valves made by Kieley & Mueller, North Bergen, N.J., so their construction involved some delicate engineering. As installation requirements in a tonnage oxygen plant made it necessary for the valves to be on their sides the guiding problem for the valve plug was extremely intricate. It was solved by equipping the guide posts with linear-type roller bearings which permit friction-free movement of the valve plug between open and closed positions

A Look at the SPECIFICATIONS SHOWS YOU WHY THIS DRILL CAN REALLY PRODUCE!

Today's tight shop schedules call for drills that can stand up—like the "Buffalo" No. 22 Round Column Drill shown. These specifications show why:

COLUMN DIAMETER — (steel) . . . 5.5"
SPINDLE - LEAST DIAMETER . . 1.312"
HEIGHT (spindle raised) . . . . . 24"
DRILL CAPACITY (cast iron) . . . . 2"

Spindle runs smoothly on ball bearings and is held tightly to avoid deflection—for long, accurate use. Maximum space between spindle nose and the 19.50" O.D. working table is 27½", and you can drill to the center of a 22" circle. WRITE FOR BULLETIN 2989-F for further facts on these drills.



"BUFFALO" HAS THE DRILL FOR YOU!

Starting with the No. 14 high-precision drill for up to ⅝" holes, "Buffalo" builds 9 different types of drills to suit every requirement, on up to the big "RPMster" with 1000 instantly changed speeds. WRITE US ABOUT YOUR TYPE OF OPERATION and we'll mail you applicable bulletins.

BUFFALO No. 22 DRILL — available in round column or pedestal types; sensitive or power feed; single or multiple spindle. All controls easily reached. All adjustments by crank.

"Buffalo"

BUFFALO FORGE COMPANY
158 Mortimer St. Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

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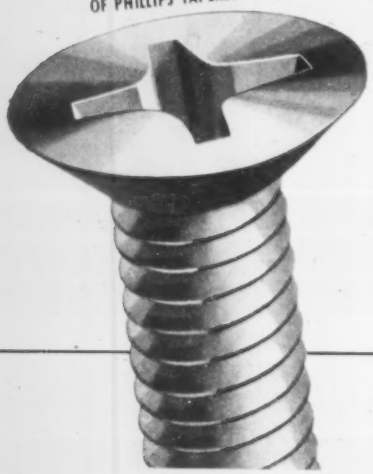
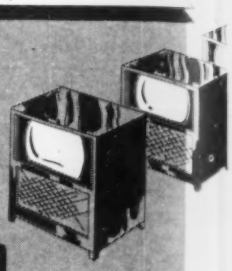
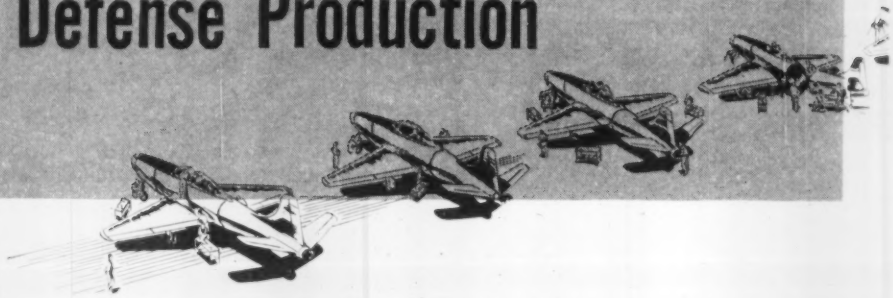
American Armament Demands Speed . . . .
Speed Demands American Phillips Fastening

The "Clue to Quality" in Consumer Goods is the Key to Quantity in Defense Production

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS







All speed limits are shattered . . . when assembly departments are geared up to power-driven American Phillips Screws. For this modern fastening method ends all excuse for "fumbling and dropping" . . . drives automatically straight . . . turns the screw-head up flush-tight. What's more, every American Phillips fastening has unmatched torque values and vibration resistance. *And time savings run as high as 50%!*

This is the *only* fastening method *both* fast and accurate enough for emergency conditions. And American is the place to come, for fast assistance on applications of any Phillips product . . . including roll thread, thread-forming, thread-cutting, and self-locking fastenings. *Get in touch today:* American Screw Co., Willimantic, Conn. Plants at Willimantic and at Norristown, Pa. Warehouse and offices at Chicago.

AMERICAN SCREW COMPANY

PHILLIPS HEADQUARTERS

1838

...cient of surface friction and ...stands high temperatures and ...al shock. The company is offering ...s services to industrial designers ...d parts and equipment manufacturers who may wish to investigate the possibilities of an industrial ...lain enamel finish.

Chips Vacuum Cleaned

...ig grinders with vacuum cleaners attached are being sold by Moore Special Tool Co., Bridgeport, Conn. The machine tool building firm had tried a number of methods for picking up metal chips in and around their plant when one of their engineers decided to try a vacuum cleaner made by Lewyt Corp., Brooklyn, N. Y.

Success of the experiment led Moore to make the Lewyt cleaner an accessory of their latest model jig grinder and to recommend it highly to grinder purchasers. Cleaners are purchased without wands, attachments or container. A special length of tubing and a nozzle are provided by Moore and reach to the table of the grinder for removal of dust and chips.

Grease Has Many Uses

An oxidation inhibited multipurpose grease, Cosmolube, which meets many grease needs in the average industrial plant is offered by E. F. Houghton & Co., Philadelphia. A feature of this grease which gives it versatility, is its resistance to high heat, cold or wet conditions.

Cosmolube is a cold-milled grease of a very smooth texture with excellent oxidation stability. It clings well to all metal surfaces, reducing leakage to a minimum. Available in two consistencies, NLGI No. 1 and No. 2, it simplifies lubrication, reduces errors of misapplication and saves time and space since one grease does many jobs.

Hard-Surfacing Hints Offered

Applications, precautions and suggestions on the proper procedures in hard-surfacing manganese steel are contained in a bulletin prepared by Rankin Mfg. Co., Los Angeles. Basically it states that success in the facing of manganese is in avoiding reaching high temperatures throughout the body of the steel, a precaution to be observed on pieces even as small as a shovel tooth.

Where precautions outlined in the article entitled "Hard-Surfacing Manganese Steel" have been observed, the material has successfully been hard-

OUT OUR WAY
MY OWN FAULT? LISSEN, YOU NUMB-SKULL, IF YOU'D PUT SOL-SPEEDI-DRI ON THAT OIL SOAKED FLOOR I WOULDN'T SLIP NO MATTER WHAT!
YOU'D GET HURT IN A PADDED CELL! I SUPPOSE TH' GEARS RAN YOU ALL OVER TH' SHOP TO GRAB YOUR FOOT.'
THEM TWO HAVE BEEN ARGUIN' EVER SINCE THEY WAS APPRENTICE BOYS TOGETHER-- I DON'T THINK THE FLOWERS WILL DO MUCH GOOD, DO YOU?
THE OLD BOY COULD AT LEAST SEND FOR A SAMPLE OF SOL-SPEEDI-DRI AND SEE FOR HISSELF
SYMPATHY
J.R. WILLIAMS

America's Largest Selling Oil and Grease Absorbent!

SOL·SPEEDI·DRI

SOL-SPEEDI-DRI is the *sales leader* in the oil and grease absorbent field. Always has been. It makes floors safe for walking, safe for working. Tests conducted by independent laboratories, by large national users, and by ourselves all come out the same—pound for pound, dollar for dollar, SOL-SPEEDI-DRI gives you *more for your money*, all factors considered. Send the coupon for free sample today. Make your own comparisons. Then you, too, will standardize on SOL-SPEEDI-DRI!

SPEEDI-DRI CORP., 210 W. Washington Sq., Phila. 5, Pa.

Warehouse stocks maintained in principal cities of the United States and Canada.

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FREE SAMPLE: Fill out the coupon and mail today for big, free sample.

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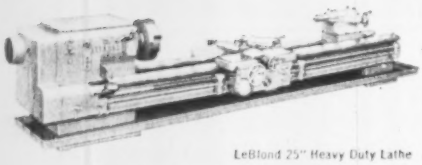
S 2-51

LE BLOND proudly presents

we mesh fewer gears to give you greater power on...



LeBlond 25" Heavy Duty Lathe

LeBLOND HEAVY DUTY LATHES

The headstock design of LeBlond Heavy-Duty Lathes incorporates the free-running principle, with hardened and ground steel gears.

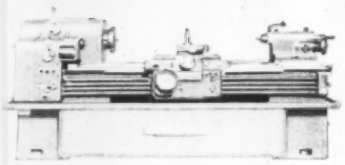
Result? Fewer gears in mesh at any given spindle speed to minimize no-load friction horsepower. More *smooth* power for your production work. Longer life from your LeBlond Heavy-Duty Lathe.

In addition to the Heavy-Duty Engine Lathe sizes shown, LeBlond builds a 20" Medium Duty Engine Lathe and accurate, versatile Toolroom Lathes in 12", 14", 16" and 20" sizes.

12" 14" 16" 20" 25" 32"

NOTE: *LeBlond also builds 40" and 50" Heavy-Duty Engine Lathes.*

you can't stump this toolroom expert



LeBLOND RT TOOLROOM LATHE

To our knowledge, the exclusive LeBlond 16" RT Toolroom Lathe has never been stumped! Infinitely variable speeds from 6 to 1500 r.p.m. Feeds from .0007" to 2.064". Threads from ¼ to 120—American, diametral, module and metric. 4-directional rapid traverse. Automatic chasing stop.

The RT is also built in a 16" Heavy Duty Engine model with 16 single-lever controlled speeds from 30 to 1537 r.p.m. 4-directional rapid traverse. Reverse to leadscrew at apron. Automatic chasing stop.

RT

BUILT-IN FEATURES

- 4-directional rapid traverse
- Combination gear and belt drive
- Automatic chasing stop
- Reverse to leadscrew at apron
- Single-lever positive-jaw feed control
- Single-lever speed choice
- Automatic lubrication through headstock, feedbox, apron

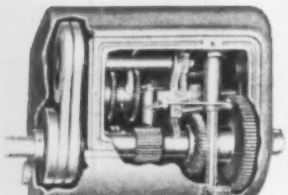
toolroom lathe

- Variable speeds—6 to 1500 r.p.m.
- 90 feeds—.0007" to 2.064"
- 90 threads—¼ to 120, American, module, metric
- Start-stop-reverse spindle control at apron
- 7½ horsepower motor

engine lathe

- 16 speeds—30 to 1537
- 60 feeds—.0013" to .230"
- 60 threads—2 to 120
- 15 horsepower motor

THIS LATHE USES ITS HEAD to give you full power at all twelve speeds from 28 to 1800 r.p.m.



LeBLOND DUAL-DRIVE

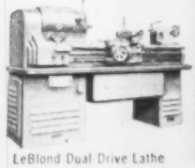
Dual Drive headstock design combines belt and gear drive to give you the widest range of speeds in the medium-price class—all at full horsepower.

Result? Smooth *full* power at high speeds—ideal for carbide and fine-finish turning. Rugged *full* power at low and intermediate speeds—for fast, efficient rough turning. Add convenient, single-lever speed control and the widest feed range in its class—and you have a lathe that does more jobs, faster, better, easier than any comparable machine.

15"

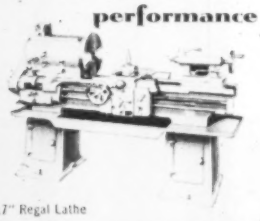
DUAL-DRIVE FEATURES

- 15" swing
- Combination belt and gear drive
- Twelve speeds from 28 to 1800 r.p.m.
- Ninety-six feeds from .0004" to .106"
- Forty-eight threads from 4 to 224
- Single-lever speed control
- Totally-enclosed feed box
- Electric brake, forward and reverse spindle control at apron
- Single-lever positive jaw feed control
- Automatic lubrication through headstock and feed box
- Hardened steel gears and anti-friction bearings
- Multiple automatic length stops
- One-piece apron
- Hardened and ground replaceable steel bed ways
- Taper key drive spindle nose



LeBlond Dual Drive Lathe

these heavy-duty features improve light-duty performance on...



LeBlond 17" Regal Lathe

LeBLOND REGAL LATHES

- Geared Headstock
- Quick-Change Feed Box
- Separate Leadscrew and Feed Rod
- Taper Key Drive Spindle Nose
- One-Piece Apron

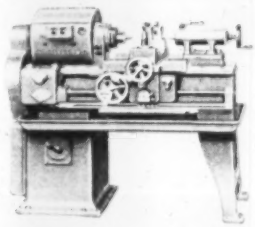
Why can LeBlond give you the most rugged, dependable performance in the light-lathe class? Because only LeBlond can tap the vast engineering and production facilities of a plant building 76 lathe models. Add to this LeBlond's 63 years of leadership in machine tool design and production . . . and you have the LeBlond *combination* for top value in lathes.

13" 15" 17" 19" 21" 24"

NOTE: *LeBlond also builds Regals in these models:*
13" Bench • 17", 19", 21", 24" Gap
17/28" and 19/30" Sliding Bed Gap

these LATHES for 1951

here's a production lathe with a stripped-down price tag



LeBlond 13" Rapid Production Lathe

LeBLOND "RAPID PRODUCTION"

The price tag is the *only* "stripped-down" feature about this lathe. It was designed *especially* for your high-production turning and facing to give you a production machine that will handle a *variety* of work within the range *you* choose.

The 13" Rapid Production Lathe may be ordered with your choice of three headstocks that give you any of the following speed ranges:

6 speeds from	68 to 400 r.p.m. 102 to 600 r.p.m. 200 to 1200 r.p.m.
4 speeds from	450 to 3600 r.p.m. 600 to 3500 r.p.m. 600 to 1800 r.p.m.
2 speeds	600 and 1200 r.p.m. 900 and 1800 r.p.m. 1800 and 3600 r.p.m.
Single speeds	900 r.p.m. 1800 r.p.m. 3600 r.p.m.

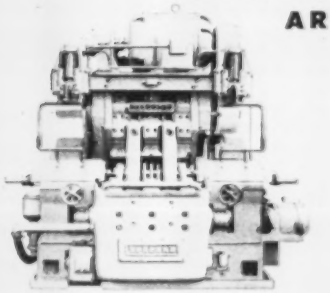
13" 17" 20"

PRODUCTIVE ATTACHMENTS

- Automatic back facing attachment
- Lever draw-in attachment
- Wheel draw-in attachment
- Air operated chuck
- Air operated tailstock
- Quick-acting, lever operated tailstock
- Special arbors
- Compound rest
- Plain and compound connected rests
- Plain connected rests
- Plain rest and turret tool post connected
- Taper attachment
- Standard multiple tool blocks
- Turret tool post on carriage
- Cross and length stops
- Chip Pan
- Motor driven coolant pump

17" and 20" machines are available with similar speed range choices

9 out of 10 crankshaft lathes built today ARE LeBLONDS



LeBlond ILB Crankshaft Lathe

LeBlond has been *the* pioneer and developer of modern crank-turning equipment since 1905.

LeBlond makes Lathes for roughing and finishing all elements of any crank—small air compressor types, automotives and huge diesel engine crankshafts. The complete line includes automatic Lathes for mass production and universal Lathes for handling a variety of cranks.

LeBlond has the right machine for your job. Send your specifications in today for an estimate. Remember, more than 9 out of 10 Crankshaft Lathes built today are LeBlonds!

7ACS
automatic rough-turning of line bearings

DM
automatic finishing of line bearings

1LB
automatic rough and finish turning of line bearings, flange and stub ends

2LB
same as 1LB but larger

6AC
automatic cheeking and rough or finish turning pin bearings

No. 1
universal crankshaft and automatic

26" UNIVERSAL HEAVY DUTY
universal for cranks of max. 3" throw

36" UNIVERSAL HEAVY DUTY
universal for cranks of max. 4" throw

Le Blond also builds

SLIDING BED GAP LATHES—16"/38", 25"/50" and 32"/60"
For a variety of parts with unusual or irregular projections such as shafts with large flanges, odd shaped blocks, large face diameters and many similar jobs requiring a flexible gap and center distance.

PLAIN BED GAP LATHES—12", 14", 16", 20", 25" and 32"
For jobs as above where adjustable gap is unnecessary.

HOLLOW SPINDLE LATHES—16", 27" and 30"
For oil country requirements or any work requiring large openings through the spindle.

AUTOMATIC LATHES—12" 16" and 3AC
For completely automatic machining with multiple tooling.

"HYDRA-TRACE" DUPLICATING ATTACHMENT
For smooth hydraulic turning and facing of a great variety of contours.

NO. 2 CUTTER GRINDER
Industry's standard for cutter sharpening and a wide range of toolroom grinding work.

COMPLETE LINE OF LATHE ATTACHMENTS

Sixty-four years of leadership in the design and production of machine tools stand behind every one of the 76 lathe models built by LeBlond. For the *right* lathe for your job, call your nearby LeBlond Distributor or write—

R. K. LeBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

Sales Offices in New York, Chicago and Detroit.

LeBLOND of Cincinnati

World's largest builder of a complete line of lathes.

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surfaced at a saving of thousands of dollars to users. Copies of the bulletin are available by writing to Rankin Mfg. Co., 3072 W. Pico Blvd., Los Angeles 6.

Bearing Maintenance Gets Study

Bearing maintenance techniques and successful maintenance, installation and removal procedures will be the subject of a continuing study in pamphlet form published by the Anti-Friction Bearing Distributors Association, Cleveland. A file folder binder will be sent to each bearing user who requests it on company letterhead in which issues can be compiled as they are published.

Autopilot Has Versatility

An autopilot that will perform all combat maneuvers with split-second accuracy is a recent addition to the combat equipment coming from the metalworking industry. It was developed by Westinghouse Electric Corp. in co-operation with the Air Materiel Command's Armament Laboratory. It will go into the F-94C all-weather fighter.

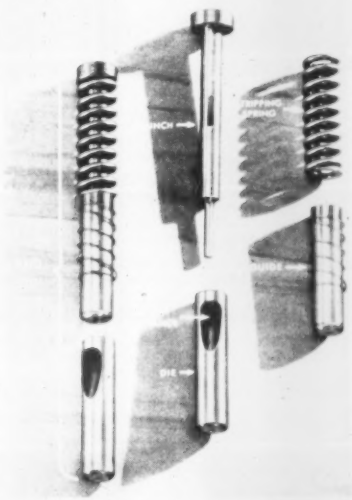
Unflustered by great bursts of speed or abrupt changes of direction, the midget autopilot also takes complete control of the plane in level flight. Complete maneuverability is achieved by using three non-tumbling gyroscopes locked to the plane. Gyroscopes stay on the job no matter what evasive tactics the plane employs. Conventional autopilots contain gyros that would tumble if the pilot put his plane through intricate maneuvers, sending the plane into a series of dangerous gyrations.

Tied in to the plane's radar and instrument landing system, the autopilot will enable tracking enemy targets automatically and landing in the darkest, foggiest weather.

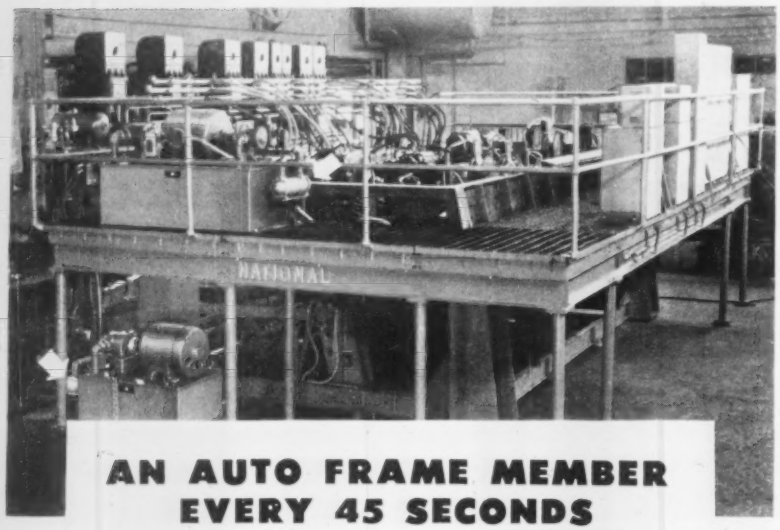
Battery Is Space Saver

Portable instrumentation units and other applications where power packed into a small space is important can make use of the model No. 5 HR Silvercel storage battery made by Yardney Electric Corp., New York. Light in weight and occupying less area than a lead-acid battery, the 5 HR can be discharged at 5 amperes up to 60 minutes and is capable of being discharged at rates up to 20 amperes.

Hole Punching Simplified



PRESS DOWNTIME in setting up for punching holes in sheetmetal parts with either a stamping press or press brake is reduced with a multiple hole punching system developed by Wales-Strippit Corp., North Tonawanda, N.Y. Illustrated is a Wales punch and die unit to show its components. Holes are drilled in both the Wales box-type and twin plates using a master template as a pattern. Job is set up outside the press and production begins on the first downstroke



AN AUTO FRAME MEMBER EVERY 45 SECONDS

...a feat of temperature-guarded hydraulic power

Turning out a complete automobile frame member every 45 seconds is this immense National Multi-Spot Welding Machine, which performs the mighty feat of 240 spot-welds *automatically!*

One of two "specials" developed for the automotive industry, it tips the scales at 50 tons and consumes an area 35 ft. square by 20 ft. high.

Side pieces of the frame (from 113 to 123") are first tack-welded at 16 points to a steel plate, then moved along to the main section of the machine where 7 carriages, each with 2 welding heads, proceed lengthwise along the work, welding as they move, joining the pieces into a single unit.

Movement of heads and the frames is powered hydraulically by 2 pumping units (one on catwalk and the other below). Should pump slippage or leakage be permitted to occur, through excessive oil temperature, 45-second production could well slow down to a walk — or even stop altogether.

Mindful of this, National Electric Welding Machines Co. furnishes compact Ross Type BCF Exchangers as built-in equipment, *to assure that the oil will be maintained at safe and most effective temperatures* — as most builders of hydraulic machinery are wisely doing today.

★ DOZENS OF HYDRAULIC APPLICATIONS ILLUSTRATED in Broadside 1.1K4. Write.

ROSS HEATER & MFG. CO., INC., Division of American Radiator and Standard Sanitary Corp., 1431 West Ave., Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

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Serving home and industry— AMERICAN-STANDARD • AMERICAN BLOWER
CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

New Books

Metal Rolling Theory

The Rolling of Metals, Theory and Experiment, Volume 1, by L. R. Underwood, chief engineer, Rolling Mill Department, W. H. A. Robertson & Co. Ltd., Bedford, England; cloth, 344 pages, 6 x 9 inches; published by John Wiley & Sons Inc., New York, for $6.50; available from STEEL, Penton Bldg., Cleveland 13, O.

Extent of recent scientific development and resulting progress in the technique of rolling flat metals, is recorded in Volume 1. Principal factors involved in the phenomena of rolling are shown in the manner in which they are related or illustrated. The book had its origin in a report prepared by the author for the rolling mill research subcommittee of the British Iron & Steel Federation. His conclusions are drawn either directly from the quoted experimental work or from comparisons of theoretical findings with the results of experiment.

Fundamental aspects of the subject are covered, such as forward slip, friction between rolls and material, and friction hill theories of rolling and methods of calculation of the rolling load based upon them. For the sake of illustration the reader is introduced to the subject by consideration being given to the simplest case of rolling in which ideal conditions are used.

Then the case is reviewed in which the resistance of deformation varies along the arc of contact due to work-hardening in cold rolling and to variation of compression rate in hot rolling, without tension and with front and back tension either singly or together. The added complication of the elastic deformation of the roll in the arc of contact and the case in which work-hardening, roll flattening, front tension and back tension all occur together are subsequently covered.

Material Behavior

Inelastic Behavior of Engineering Materials and Structures, by Alfred M. Freudenthal, professor of civil engineering, Columbia University, and lecturer and research consultant in theoretical and applied mechanics, University of Illinois; cloth, 587 pages, 5¾ x 8½ inches; published by John Wiley & Sons Inc., New York, for $7.50; available from STEEL, Penton Bldg., Cleveland 13, O.

A fundamental approach to materials research based on the analysis of the underlying unifying principles, this book covers problems of research in the mechanical properties

"HERCULES"* RED-STRAND the DEPENDABLE WIRE ROPE for TOUGH JOBS

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Experienced wire rope users have found that they can depend on "HERCULES" (Red-Strand) for the strength . . . toughness . . . durability — necessary for consistent, safe, and economical service. Our exacting standards and rigid tests insure these results.

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2 GREAT, NEW PORTER CUTTERS

for cutting extremely hard materials, including stainless steel

PORTER CARBIDE EDGED CUTTER

Another important Porter development for cutting extra hard materials, such as stainless steel rods, wires, pins, etc. Tough carbide edges are firmly brazed to cutting jaws. Stands up under the toughest usage! Pays for itself many times over. #3CE cuts up to 5/16" dia. #4CE cuts up to 3/8" dia.

for cutting hot steel bars, rods, wires, etc.

PORTER HOT METAL CUTTER

An ideal tool for steel mills and fabricating plants. Made of special hot work steel and special heat-treated jaws, for long life under continuous heavy duty with no loss to cutting edge temper.

#3HW cuts up to 5/16" dia. #4HW cuts up to 3/8" dia. Order through your industrial supply house!

H. K. PORTER, INC., 74 Foley Street, Somerville 43, Mass.

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IT'S A CINCH TO ADAPT "STANDARDS" FOR HUNDREDS OF JOBS

LOW COST? I'LL SAY! MOST SIZES COST LESS THAN HIGH-SPEED STEEL TOOLS

I CAN USE 'EM ON ALMOST ANY MACHINE... ANY JOB, AND ANY MATERIAL!

YOU GET REALLY FAST LOCAL DELIVERY... STOCKS IN 95 CITIES

Specify **CARBOLOY**®

CEMENTED CARBIDE

STANDARD TOOLS

for Maximum Productivity

plus ADAPTABILITY...UNIVERSAL USE
LOW COST...GREATER AVAILABILITY

CARBOLOY "Triple C" PLAN

delivers maximum productivity with carbides!

You can get even greater productivity out of carbide tools with the Carboloy "Triple C" Plan of Coordinated Carbide Control. The CCC Plan Book explains in detail just how this plan works and how you can use it in your own plant.

Write for this
FREE BOOK
GT 216-A

NAME YOUR TEST! Carboloy Standard Tools are top-ranking in every department.

Uniform high quality and consistent performance of Carboloy tools assure you of—

- Maximum production per machine
- Maximum machine speeds
- Maximum adherence to tolerances
- Maximum tool life
- Maximum pieces per tool
- *Minimum number of rejects*

. . . advantages that add up to maximum productivity — plant wide

Carboloy Standard Tools can be adapted to do up to 80% of your single-point tool machining! They can be used to machine any metal or non-metallic material and deliver unmatched performance on steel cutting. And Carboloy Standard Tools are comparable in price to many high-speed steel tools, and in many sizes are actually cheaper.

Write today for price list and new Catalog GT 250.

CARBOLOY COMPANY, INC.
11141 E. Eight Mile Ave., Detroit 32, Michigan

The registered trade-mark "Carboloy" denotes manufacture by Carboloy Company, Inc.

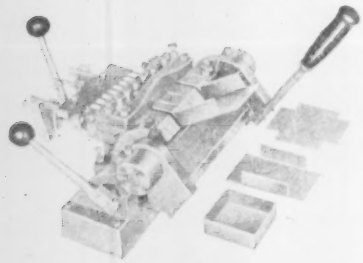
THE QUALITY BRAND OF

STANDARD TOOLS

"The least number of tools for the greatest number of jobs"

New! di-acro
BOX FINGER BRAKE

Four models 6" 12" 18" 24"
Capacity — 16 Gauge Steel



3 TOOLS IN ONE
1 BOX and PAN BRAKE
2 STANDARD BRAKE
3 BAR FOLDER

One box or 10,000—can be economically produced with the versatile new Di-Acro Box Finger Brake.

Serves perfectly for all standard brake operations — an Acute Angle Bar converts the brake to a bar folder for licks, seams, hems, and sharp angles.

The unique Di-Acro Open End Finger forms square or triangular tubes and other similar parts. Real machine tool construction, with hardened and precision ground box fingers, assures permanent accuracy in producing duplicated parts. The Box Finger Bar can be easily mounted on all standard Di-Acro Brakes.

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describing DI-ACRO Shears, Punches, Benders, Brakes, Notchers and Rod Parters—also Power Shears and Benders.

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and behavior of materials, problems of mechanical testing of engineering materials and evaluation of test results with regard to performance in service problems of design of structures and machine parts and the theory of technological processes also are included.

The author uses the pictorial physical approach based on the modified Bohr model of atomic structure. As an introductory text book rather than a reference book, the main emphasis has been placed on the presentation of the physical response of engineering materials to forces, time and temperature. References have been selected to enable the reader to find a few of the most important or most representative original publications concerning any particular topic related to the subject.

Book follows a logical arrangement, the introduction discussing the purpose of the study of mechanical behavior and basic concepts and definitions. Parts A and B develop the structural and phenomenological framework of the mechanics of inelastic behavior of engineering materials. Part C deals with specific problems of inelasticity, with design of structures and machine parts under various conditions and with mechanical testing.

Speed Reducers Improved

Greater casting uniformity and improved appearance are features of the improved line of standard duty speed reducers announced by Cone-Drive Gears, division of Michigan Tool Co., Detroit. Employing double-enveloping gearing, all operating parts in the improved line are directly interchangeable with the company's former models.

Center distance on models offered is 2, 2½ and 3 inches. They are available in ratios of 5/1 to 50/1 (60/1 on the 3-inch model). Horsepower ratings for the reducers range as high as 9.04 hp at 1750 rpm.

Casting Impregnation Described

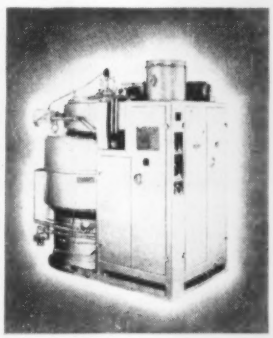
Method of sealing porous areas in castings that must withstand high liquid or gas pressures and a way to salvage castings having blow holes and surface defects are discussed in question and answer form in a booklet prepared by Tincher Products Co., Sycamore, Ill. Porosity is overcome with the Tincher process which combines a metallic seal with equipment and an engineering service. The Tincher Blockbinder is a machine for filling blow holes and surface defects. It is suitable for gray iron, brass, bronze and aluminum.

Sicon
New, Improved
SILICONE BASE
HIGH HEAT-RESISTANT FINISH
Formerly MICO

✓ Production Line Proved
for metal products requiring a protective coating with resistance to extreme high heat.

✓ Withstands 1000° (F.)
without blistering or peeling

The Vapor Clarckson Steam Generating Unit is a case in point—



☆ This unit has inside temperatures of up to 3,000° (F.) and develops full capacity in two minutes to deliver 1,000,000 b.t.u. A rugged finish is necessary to protect it not only against heat, but also against the corrosive and deteriorating influences of dirt, grime, oil, and climatic elements. SICON Aluminum is used because it answers these exacting requirements. Due to its quick drying it can be handled minutes after application. Write today for *latest tech data* describing many other SICON applications.

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Silicone-Base Finish is manufactured exclusively by
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INDUSTRIAL FINISHES CO.
Waukegan, Illinois
ENAMELS · SYNTHETICS
LACQUERS · VARNISHES

CALENDAR
OF MEETINGS

Denotes first listing in this column.

Feb. 5-9, **National Crushed Stone Association and Agricultural Limestone Institute:** Annual meeting, Netherlands Plaza Hotel, Cincinnati. Association and institute address: 1415 Elliot St., Washington 7.

Feb. 7, **Bituminous Coal Research Inc.:** Annual meeting, Deshler-Wallick Hotel, Columbus, O. BCR address: Southern Bldg., Washington 5.

Feb. 8, **American Coke & Coal Chemicals Institute:** Regional meeting, Congress Hotel, Chicago. Institute address: 711 14th St., N.W., Washington 5.

Feb. 9, **National Welding Supply Association:** Western zone meeting, Hotel St. Francis, San Francisco. Association address: 505 Arch St., Philadelphia 6.

Feb. 11-15, **National Sand and Gravel Association and National Ready Mixed Concrete Association:** Annual meeting, Roosevelt Hotel, New Orleans. Association address: National Theatre Bldg., 13th and E Sts., Washington 4.

Feb. 13-15, **Radio-Television Manufacturers Association:** Mid-winter conference, Stevens Hotel, Chicago. Association address: 1317 F Street, N.W., Washington 4.

Feb. 14, **Steel Kitchen Cabinet Institute:** Annual meeting, Hotel Cleveland, Cleveland. Institute address: Engineers Bldg., Cleveland 14.

Feb. 16, **Eastern States Blast Furnace Association:** Meeting, William Penn Hotel, Pittsburgh.

Feb. 16-23, **Automotive Electric Association:** Meeting, Edgewater Beach Hotel, Chicago. Association address: 802 Michigan Blvd., Detroit 26.

Feb. 19-22, **American Institute of Mining and Metallurgical Engineers:** Annual meeting, Jefferson Hotel, St. Louis. Institute address: 29 W. 39th St., New York.

Mar. 5-7, **Hydraulic Institute:** Quarterly meeting, Santa Barbara Biltmore Hotel, Santa Barbara, Calif. Institute address: 122 E. 42nd St., New York.

Mar. 5-9, **American Society for Testing Materials:** Spring meeting, Cincinnati. Society address: 1916 Race St., Philadelphia.

Mar. 6-8, **Society of Automotive Engineers:** Passenger car, body and materials meetings, Hotel Book Cadillac, Detroit. Society address: 29 W. 39th St., New York.

*Mar. 6-9, **American Roadbuilders Association:** Meeting, Cincinnati. Association address: 1319 F St., Washington 4.

Mar. 12-15, **National Electrical Manufacturers Association:** Meeting, Edgewater Beach Hotel, Chicago. Association address: 155 E. 44th St., New York 17.

Mar. 13-16, **National Association of Corrosion Engineers:** Conference and exhibition, Statler Hotel, New York. Conference committee address: P. O. Box 6120, Philadelphia 15.

Manual Has Coating Ideas

A manual outlining process economies and indicating how industry can conserve essential alloys and still maintain normal production is available from the Gray Iron Founders' Society, Cleveland. It is entitled "Metallic and Nonmetallic Coatings for Gray Iron." The 76-page manual contains 45 illustrations and describes how these coatings can be made without sacrificing wear, heat or corrosion resistance.

When the World Needs a Lift

UNIT 357 on "earth moving" job, lifting globe into position at Midwest Fair exhibit.

It Picks a UNIT to do the Job!

Yes . . . it's really amazing what you can do with a UNIT Crane or Excavator. Take a UNIT 357 Mobile Crane, for example. It travels anywhere! Any time! Powered by ONE engine . . . controlled and operated by ONE man. Compact, it has light-truck mobility — the smoothest operating and easiest handling crane made. Works efficiently even in small yards where space is limited. FULL VISION CAB gives operator complete visibility in all directions.

UNIT 357 is self-propelled . . . mounted on six pneumatic tires . . . duals on the rear . . . singles on the front. Balanced weight distribution keeps entire undercarriage on ground while working. Dimensions meet all highway requirements. Get the complete UNIT 357 story. Write for bulletin.

CONVERTIBLE TO ALL ATTACHMENTS

Rapid conversion, from one attachment or boom to another, is one of the many important UNIT 357 features. If the material handling operations in your plant call for magnet, crane, or clamshell, the UNIT 357 is the logical, and economical, answer to your problem. There is no limit to UNIT 357 versatility!

UNIT CRANE AND SHOVEL CORP.

6521 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • TRENCHOES • MAGNETS

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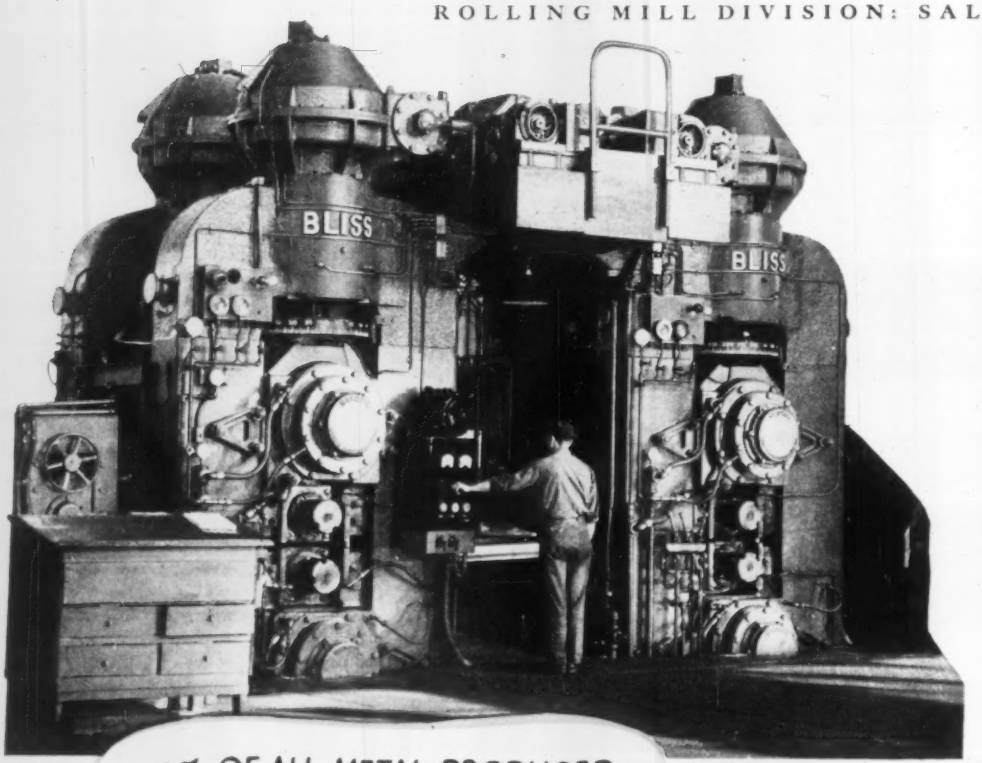
At Western Brass Mills, too,

One hundred mill runs daily to produce "tailormade" brass, copper, bronze and nickel alloy sheet and strip—that's the job assigned to rugged Bliss four-high mills at Western Brass Mills. Equipped with precision controls and adjustments to speed changeovers, Bliss mills work round the clock at Western plants in East Alton, Illinois and New Haven, Connecticut, delivering smooth-surfaced sheet and strip, true to gauge.

Performance-tested material-handling devices specially engineered by Bliss for Western Brass Mills, a division of Olin Industries, Inc., include pay-off reels, coil entry conveyors, sticker guides, tension reels, roller conveyors, Billy rolls, coil hoists and many others.

Your metal production, ferrous or non-ferrous, may benefit from new Bliss equipment—rolling mills and accessories, hot or cold. There's a good chance that Bliss engineers, who created many of the metal-producing industry's "firsts," will have the right answer for you.

E. W. BLISS COMPANY • *General Office:* CANTON, O.
ROLLING MILL DIVISION: SALEM, OHIO

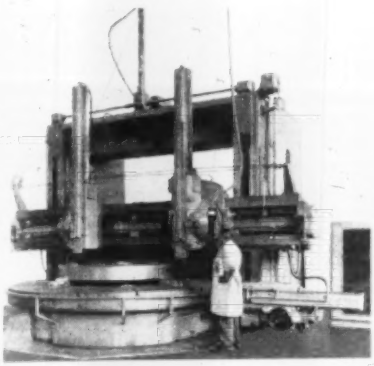


95% OF ALL METAL PRODUCED HERE AT EAST ALTON PASSES THROUGH THIS TANDEM MILL

New Products and Equipment

Shift Lever Eliminated

Simplified operation of the 12-foot Cincinnati Hypro vertical boring and turning mill made by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., is made possible through the elimination of the mechanical shift lever from either the front or the side of the machine. Control func-



tions are handled through the pendant station including remote shifting of the single shift for the two table speed ranges. Shifting signals from the pendant control energize the solenoid which activates the single shift mechanism hydraulically. Clutch and gear train respond to this hydraulic circuit arrangement. Two table speed ranges are then available and are obtained through a 50-hp adjustable voltage drive.

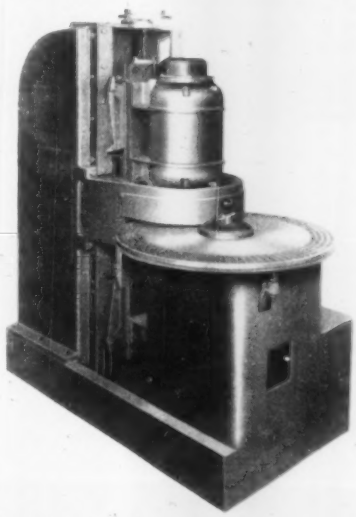
A metal cabinet encloses the motor-generator set and controls which operate the 50-hp motor. The cabinet is equipped with intake air filters and is louvered for cooling.

Rail and side heads have independent traverse motors reducing the number of gears and spline shafts required. A feed box provides 16 feeds between 0.004 and 0.750-inch. Independent feed reverse for the saddle and ram means that either of these machine components can be moved up or down, in or out, individually.

Grinds Two Surfaces

Double disk grinding machine model 2V-18 made by Gardner Machine Co., Beloit, Wis., grinds two parallel flat surfaces on small workpieces in one operation. It will handle small parts such as coil springs, carbon brushes, ceramic materials and similar small parts.

Two 18-inch diameter solid center abrasive disks are each driven by either 3 or 5-hp motors. Disks are each 2 inches thick. Thirty-two-inch diameter rotary work carrier is made to suit the types and sizes of the workpieces which are to be ground. Fingertip speed control is provided for an infinite range of work carrier speeds between $\frac{1}{8}$ and 1 rpm. A bayonet lock for the rotary work carrier permits rapid change of the carrier plate. Both grinding heads may be independently adjusted by means of graduated handwheels. In addition each of these heads may be tilt-



ed by those jobs requiring progressive grinding of the workpiece.

Dresser mechanism is enclosed in the main machine column. It is hand operated and fully adjustable for position.

Radiation Readings at a Glance

An atomic radiation detector to permit direct radiation readings at a glance is announced by the special products division, General Electric Co., Schenectady 5, N. Y. Called a radiation monitor, the instrument weighs less than a pound and is about the size of a quart oil can. It is equipped with a self-contained power source and has neither tubes nor batteries.

Radiation measurements are read from the monitor by noting the position of a pointer as it moves across a graded scale. The speed at which the pointer moves is in proportion to the strength of radiation and the distance it moves in a given time indicates the amount of radiation to which the instrument has been exposed. It can warn of the presence of radiation in amounts much less than those permitted by even the most stringent safety regulations.

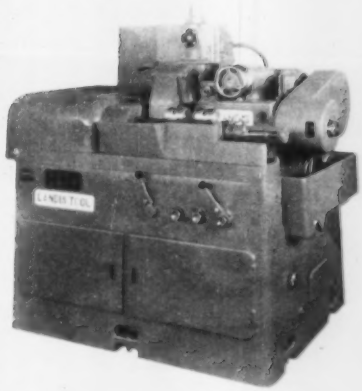
Foundry Laboratory Oven

Requirements of foundry laboratories are met with a Gordon-Campbell core baking oven made by Claude S. Gordon Co., 3000 S. Wallace St., Chicago 16, Ill. It has a heavily insulated chamber 10 x 12 x 18 inches. The maximum temperature is 550° F with a sensitive, automatic, thermostatic control.

A special double type air diffusing system is employed to insure a large amount of air entering the oven with an equal amount of air intake at both the front and back of the chamber. Gases and moisture are rapidly eliminated with a minimum of three to four air changes per minute.

Piston Skirt Grinder

Accuracy and economy in grinding the cam shaped skirt portion of automotive pistons are possible with the type H hydraulic piston grinding machine developed by Landis Tool Co. Waynesboro, Pa. Maximum capacity



of the machine is 5-inch diameter pistons with maximum length of 8 inches. The grinder can be arranged to operate on a semiautomatic cycle.

Standard wheel is 24 inches in diameter with a 3¼-inch face, driven by a 7½ hp motor. This facilitates grinding of pistons by the plunge grind method with wide wheel. It may also be arranged for traverse grinding of pistons. When traverse grinding there is an automatic feed at each reversal of the traverse until the piston is at finish size. When using a plunge grinding cycle the feed is continuous until a predetermined size

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Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How NITROGEN Refines Grain Size...

Produces Harder, Stronger, Tougher Chromium Steels

When nitrogen is added to high-chromium steel, it greatly refines the grain size of the metal and materially increases its strength, toughness, hardness, and wear resistance without sacrificing ductility or reducing corrosion resistance. For these reasons, nitrogen-bearing chromium steels are well suited for cutlery, turbine blades, and various machinery parts that are subject to extreme wear.

Added to Steel In Ferrochrome

Nitrogen is usually added to chromium steels in the form of nitrogen-bearing ferrochrome containing 0.75 per cent and up of nitrogen, 7.0 per cent chromium, and a maximum of 0.10 per cent carbon. Depending upon the chromium content of the steel, which can range between 12 and 30 per cent, the nitrogen content may vary between 0.06 and 0.20 per cent. The amount of nitrogen added to high-chromium steels should be 1 part of nitrogen to between 100 and 200 parts of chromium, depending upon the chromium content of the steel.

Nitrogen-bearing ferrochrome is added to the furnace in the same manner as ordinary ferrochrome. Nitrogen recovery will average about 90 per cent.

Improves Cutlery Steel

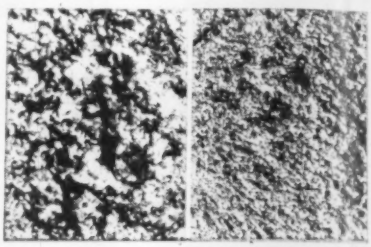
Cutlery steels and other martensitic stainless steels, such as the 12 to 14 per cent chromium low-carbon steels that are used for turbine blades, are hardenable by heat-treatment. Hardenability and strength increase with the carbon content. And, since nitrogen is a more powerful austenite-former than carbon, it is sometimes used as a substitute for part of the carbon, or as a supplement to the carbon, to increase the strength and hardenability of these steels.

Nitrogen has distinct advantages over carbon for this purpose because ductility, toughness, and corrosion resistance are retained when nitrogen is added to steel. It increases the hardness of cutlery steels without detrimentally affecting toughness or corrosion resistance. The effect of small additions of nitrogen in increasing the hardness of cutlery steels is shown in the table below.

Reduces Grain Growth During Hot-Working

The ferritic high-chromium stainless steels to which nitrogen is added have a finer grain size than ferritic steels without nitrogen, which are comparatively coarse-grained. These include the 16 to 18 per cent chromium wrought steels, high-chromium steels containing small percentages of nickel, and both the cast and wrought 20 to 30 per cent chromium steels. The function of nitrogen when added to the ferritic high-chromium steels is to preserve a fine grain size.

The nitrogen-bearing, high-chromium wrought steels are more readily rolled and forged than comparable steels containing no nitrogen, because grain growth is inhibited during hot-working operations. Greater yields are therefore obtained in rolling and fabricating. Also, strength and toughness are increased as a result of the grain refinement caused by the nitrogen addition.



Note the extent to which nitrogen refines the grain size of those specimens containing about 27 per cent chromium and 0.35 per cent carbon. The specimen at the left contains 0.05 per cent nitrogen; the one at the right, 0.30 per cent nitrogen.

Greater Strength for Austenitic Steels

Small percentages of nitrogen will increase the yield point and tensile strength of the austenitic chromium-nickel steels. These include the well-known 18 per cent chromium, 8 per cent nickel steels, and also the 25 per cent chromium, 12 per cent nickel steels. The improvement in strength is gained at no sacrifice of workability. Furthermore, nitrogen promotes the formation of austenite.

Metallurgical Service Available

ELECTROMET nitrogen-bearing ferrochrome is furnished in the following standard analysis:

Chromium	67 to 71%
Carbon	0.10% max.
Silicon	0.30 to 1.00%
Nitrogen	0.75% approx., or higher if desired.

It is produced in lump sizes of 25 lb. by 8 mesh, or 15 lb. by 8 mesh; also, in a crushed size of 2 in. by down.

If you would like additional information about the production of nitrogen-bearing steels, ask to have one of our metallurgists call, or ask for the booklet, "Nitrogen In Chromium Alloy Steels." Write to the address given above or to the ELECTROMET office nearest to you. Offices are in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York and San Francisco. In Canada: Welland, Ontario.

Effect of Nitrogen on the Hardness of Cutlery Steels*

% Cr	% C	% Si	% Mn	% Mo	% N	Rockwell C Hardness	Brinell Hardness Number (by conversion)
13.15	0.12	0.30	0.38	...	0.03	41	387
13.25	0.13	0.29	0.42	...	0.10	48	460
13.36	0.23	0.28	0.40	...	0.03	46	437
13.27	0.21	0.34	0.32	...	0.08	51	496
12.70	0.32	0.30	0.37	...	0.04	50	484
13.41	0.35	0.31	0.41	...	0.11	56	560
17.37	0.41	0.32	0.41	0.75	0.036	41	382
17.25	0.44	0.30	0.42	0.75	0.09	53	522
17.30	0.66	0.29	0.38	...	0.03	51	496
17.08	0.60	0.31	0.40	...	0.11	55	547
17.26	0.80	0.28	0.39	0.76	0.032	52	509
17.25	0.80	0.27	0.45	0.74	0.09	57	573

*Steels oil-quenched from 950°C. Held 5 hr. at 200°C. and air-cooled.

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

is reached, at which time the feed stops. A reciprocating mechanism is used to reciprocate the wheel for fine finishes. An overhead, hydraulically operated wheel dressing mechanism may be provided so that the grinding wheel can be dressed without disturbing the grinding setup. The work drive motor is 1 hp. Plug braking is used to stop the spindle rotation quickly for loading the workpieces.

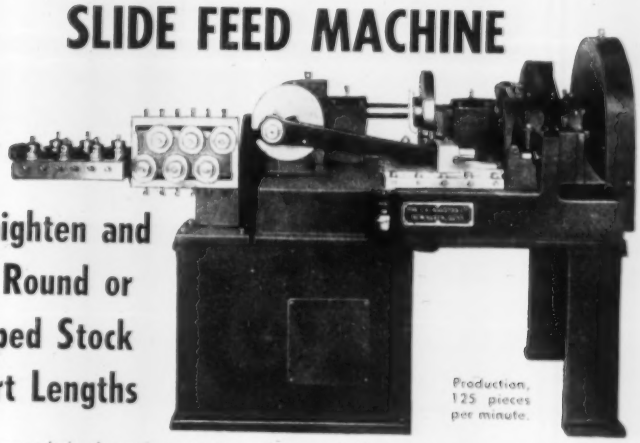
Handles Longer Bores

Longer bores can be honed with the model 415 honing machine brought out by C. Allen Fulmer Co., Cincinnati, O., than could be handled with the company's earlier model 412. It

has a working stroke of 15 inches and a capacity from ¼-inch to over 4 inches. The machine carries a 1¼-inch diameter heat treated alloy steel spindle driven by a 3 hp motor through alloy steel reduction gears. Three spindle speeds are available. Reciprocation is hydraulic with a 2 hp motor driving a Vickers pump with controls that permit reciprocating speeds from 1 to 70 feet per minute. Spindle and honing tools are hydraulically counter-balanced at all times.

Standard height under the spindle nose is 40 inches with different

HIGH PRODUCTION
HIGH PRECISION
SHUSTER *Automatic*
SLIDE FEED MACHINE



Straighten and Cut Round or Shaped Stock Short Lengths

Production, 125 pieces per minute.

Recommended wherever accuracy and a perfectly square cut are a "must." In this machine, the stock receives a shearing cut from two round dies. This method of cutting produces an accurately square cut and holds the length of cut to very close tolerances.
Capacity: ½" to 10" lengths; maximum diameter of rod, 9/16"; production, 125 pieces per minute. May be had without the 12-roll straightener if your stock is already straightened.
Detailed circulars on request. When writing please describe your set-up.

Mfd. by METTLER MACHINE TOOL, INC.
132R Lawrence St. New Haven, Conn.
Representatives in all principal cities and in foreign countries

SMALL STAMPINGS

ANY METAL, ANY QUANTITY
30 years' experience gives us the "know how".
Hundreds of satisfied customers are evidence
of our high quality.

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ADVERTISING

Good Industrial Advertising is the "Mass Production Tool" of Selling . . . Helps Salesmen Make More Calls . . . Close More Business in the Same Sales Time!

FREE—4 Useful Booklets for Industrial Executives

1. "How Industrial Advertising Meets the Demands of Top Management" and

2. "How Industrial Advertising Helps Make Sales"—Each describes 10 performance-facts reports from the advertising-sales records of such companies as E. I. du Pont de Nemours & Co., General Electric Company, Hercules Powder Company, Westinghouse Electric Corporation, Koppers Co., Inc., Standard Conveyor Co. Each tells how a sales situation was analyzed—how advertising was used in these situations, and what results were obtained.

3. "Copy That Clicks"—This is not just about advertising copy. Contains 20 examples that will give you a new viewpoint on advertising objectives; will help your advertising people do a better job.

4. "Mechanized Selling at Work"—Prepared for executives who would like to apply the same concrete, mathematical principles of efficient product production to the improved efficiency of order production.

Write to National Industrial Advertisers Association, 1776 Broadway, New York 19, N. Y. for these useful booklets. They're free.

helped get the order!

Advertising makes contacts. Carefully planned, it can reach ALL of the market and ALL of the men who may influence sales. It goes out ahead of your salesmen's calls and is in the prospect's hands after they leave, to keep contacts alive.

Advertising distributes information. It presents facts about your company . . . announces new products . . . outlines features and advantages . . . explores new markets . . . stimulates interest, preference, acceptance.

Advertising produces inquiries. Because it is continuous and widespread, advertising reaches prospects at the time they are ready to buy. Brings in the kind of leads that a salesman can turn into sales.

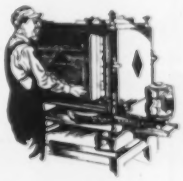
How do you get a *good* advertising program?

First, decide exactly what you expect your advertising to do. Second, plan your program to do these things and no others. Allow sufficient money for the project. If you have planned your objectives carefully, whatever investment is required to accomplish them is a reasonable expenditure. Third, mesh your advertising program with your sales program and objectives. After all, advertising is simply a better and less costly way to reach certain *sales* objectives. Fourth, give your advertising manager or agency the information, the responsibility and the authority to carry your program to success.

* * *

• *This message—one of a series by members of the National Industrial Advertisers Association—is published by* STEEL *to create a wider understanding of industrial advertising and the contribution it is making to American Industry. Reprints of this message are available in limited quantities. Address:* STEEL, *Readers Service Dept., Penton Bldg., Cleveland 13, Ohio.*

EXAMPLE 1



Allis-Chalmers built an *all-metal* low-head gyratory sifter for sifting chemicals and flour. It was the first all-metal unit ever offered. Salesmen were informed of the new product, but no special push was ordered. Ads were run in trade magazines and soon produced well over a hundred inquiries. This represents excellent volume potential for a product of this type with limited application, and high unit cost. Trial orders were directly traceable to leads secured from these ads. Salesmen spent their high-priced time only on prospects who had indicated interest.

EXAMPLE 2

Consolidated Electric Motor Company of New York has a good reputation for repair and rebuilding in their area. But there were some accounts they couldn't seem to crack. Allis-Chalmers selected Consolidated as a Certified Service Shop, gave them the right to use the well-advertised and well-known Allis-Chalmers name. Ads featuring this Certified Service Shop were run in trade magazines. Consolidated says, "Prospects who had been hard to see suddenly asked salesmen to call. People who had never been called on sent in repair jobs. Those ads did it."

EXAMPLE 3

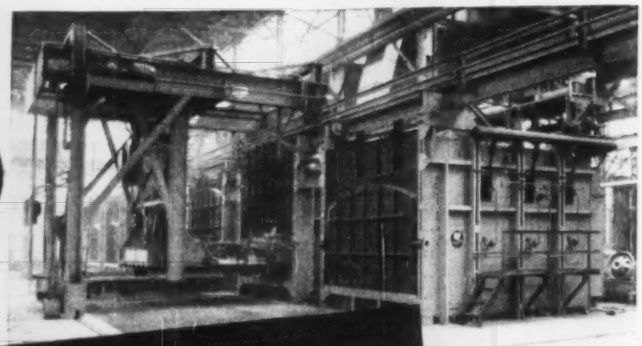
When *Texrope* department of Allis-Chalmers brought out a new low-cost method of speed control, they wanted to tell every industry about it. Salesmen would take years to get around to every prospect. Advertising in trade magazines brought in requests for further details from more than 1500 interested prospects in a few months. Some of these prospects have bought more than a hundred units at well over a hundred dollars each. Sales in all industries have been excellent.

Texrope is an Allis-Chalmers trademark.

Milwaukee Industrial Marketing Association

A CHAPTER OF THE NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION

A national organization, comprised of 3,500 members of the 34 local associations of industrial advertising and sales executives—dedicated to greater efficiency in industrial distribution and lower sales cost.



EF

Easier HEAT TREATMENT of LARGE, HEAVY CASTINGS

● The gantry crane shown with this battery of EF batch type furnaces picks up castings from a receiving platform — loads them into the furnaces — removes them after heating — lowers them into the quench — removes them after quenching and places them on an unloading platform.

Our wide experience in all phases of heat treating and related material handling problems, puts us in a preferred position to solve most any ferrous or non-ferrous annealing or heat treating problem. We solicit your inquiries.

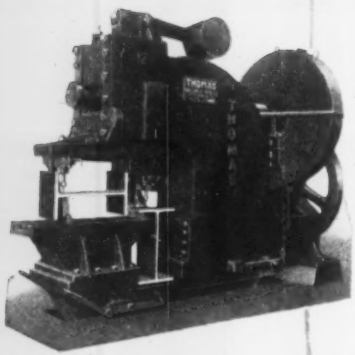
THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

BEAM PUNCHING

without tool change



The NEW Thomas Beam Punches are built in sizes to handle beams up to 12"-18"-24"-30" and 36", web and flange punching, with a single tool set-up. Any of the five sizes may be used with or without a Thomas spacing Table, depending on production needs.

THOMAS MACHINE MANUFACTURING COMPANY

PITTSBURGH (23), PA.

Write for detailed information

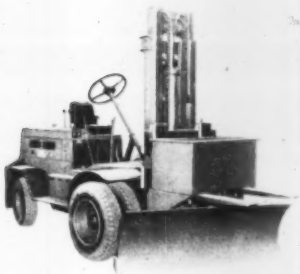
PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

22

heights optional. Standard work table carries three ⅝-inch Tee-L.C. slots and a special table with a built-in indexing cylinder holding fixture is available to replace the Tee-slotted work table. Equipment includes full pushbutton controls including pushbutton withdrawal at the end of the honing cycle.

Plow Added to Lift Truck

Easy and economical snow removal in plants is made possible with the snow plow made by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich., for use with all Clark pneumatic-tired fork lift trucks of more than 1000 pounds capacity. Attachment is detachable and no tools are required to mount, dismount it



or to adjust the blade. Two channels on the plow are placed to receive the standard forks of a lift truck when attachment is desired. Above channels is a ballast box that may be filled if necessary.

Plow is secured to back plate of attachment by a mounting which allows it to pivot in two directions, compensating for uneven running surfaces. It is held in operating position by spring tension which allows it to pivot backward when obstructions are met. The 22½-inch blade may be set at an angle from the front of the lift truck in any one of six positions.

Polishes Both Sides at Once

Small parts similar in shape to spoon and fork bowls are simultaneously surface finished with the No. 204 surface finishing machine made by Clair Mfg. Co., Olean, N. Y. Rack moves in order to expose simultaneously the inside of the bowl-like shape to small diameter convex buffs and outside diameter to large diameter concave buffs. Adjustments may be made for variations in bowl depth and length.

Machine features a waist high design for ease in loading. Actuation system is electro-hydraulic with totally enclosed hydraulic circuits being

Just one base "across the board" for straight cutting, stamping and drawing —even automatics!

You can mix Antisep A. P. Base with just plain water—and meet almost all of your cutting needs. The number of cutting fluids you need is greatly reduced. Minimum handling, smaller inventory and less storage space are required.

Use Antisep A. P. Base for most difficult machining operations usually reserved for straight cutting oils. Its exceptional cooling ability, safety, assurance of fine finish and speedy production enable Antisep to handle Automatics as well!

Antisep A. P. Base, high in sulphur and fatty content, is antiseptically treated to eliminate rancidity and definitely reduce bacteria growth. It cleans from work easily in any mild alkaline bath or by standard degreasers.

In tests and in use on toughest types of machining under all kinds of operating conditions, Antisep All-Purpose Base has proved to be more than satisfactory from every angle.

Ask the Houghton man to show you how you can reduce machining costs by using Antisep All-Purpose Base "across the board". Or write for bulletin and prices, to E. F. Houghton & Co., Philadelphia 33, Pa.

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Ready to give you on-the-job service . . .

Electro

Electro SINCE 1919

9500 Cuts On ¼" Alloy Valve Stock With

Electro's NEW CUTRITE CUT-OFF WHEELS

No time now for delays, waste or faulty production even in preparatory work!

Here's Electro with a *new* cut-off wheel of *proved* superiority in performance and durability. Think what these performance records mean to you . . .

2" x 1¾" risers cut on nickel-iron castings in 16 seconds! 9500 cuts on ¼" alloy valve stock. No binding or breakage on 5½" x 2½" heavy, stainless, alloy steel castings which are normally burned. 46.6% longer service than the average of competitive wheels on 1" stainless, low carbon, beryllium copper, silicon bronze and manganese bronze stock; and outlived and outperformed competitive wheels on 15/32" carbon steel, drill bit rod.

ELECTRO REFRACTORIES AND ALLOYS CORPORATION
344 Delaware Ave., Buffalo 2, N. Y.
West Coast Warehouse . . . Los Angeles
Canadian Electric Furnace Plant, P. Q.

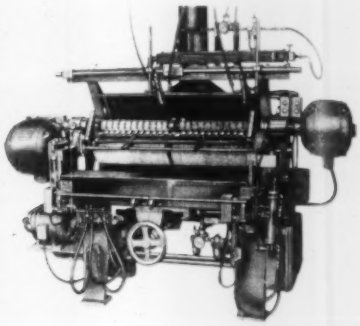
K-391

Write, wire or *phone*. We'll get a Field Engineer to you quick to prove these new wheels on *your* job. The same research skill and engineering competence that produced these new wheels are at your command upon request for cooperation on rough operations like snagging, or precision work like roll grinding.

Electro HIGH-SPEED GRINDING WHEELS
STRONG • SAFE • EFFICIENT

invulnerable to abrasives. Rol[illegible] are opened and closed by a comp[illegible]essed air circuit which permits aut[illegible]matic float of the counterbalanced r[illegible]lls in following irregular contours.

A minimum working spa[illegible] 3½ inches wide is provided by 4-inch



rolls in diameters up to 9 inches. Adjustments for speed and magnitude may be made without stopping the machine.

Steam Operates Spray Gun

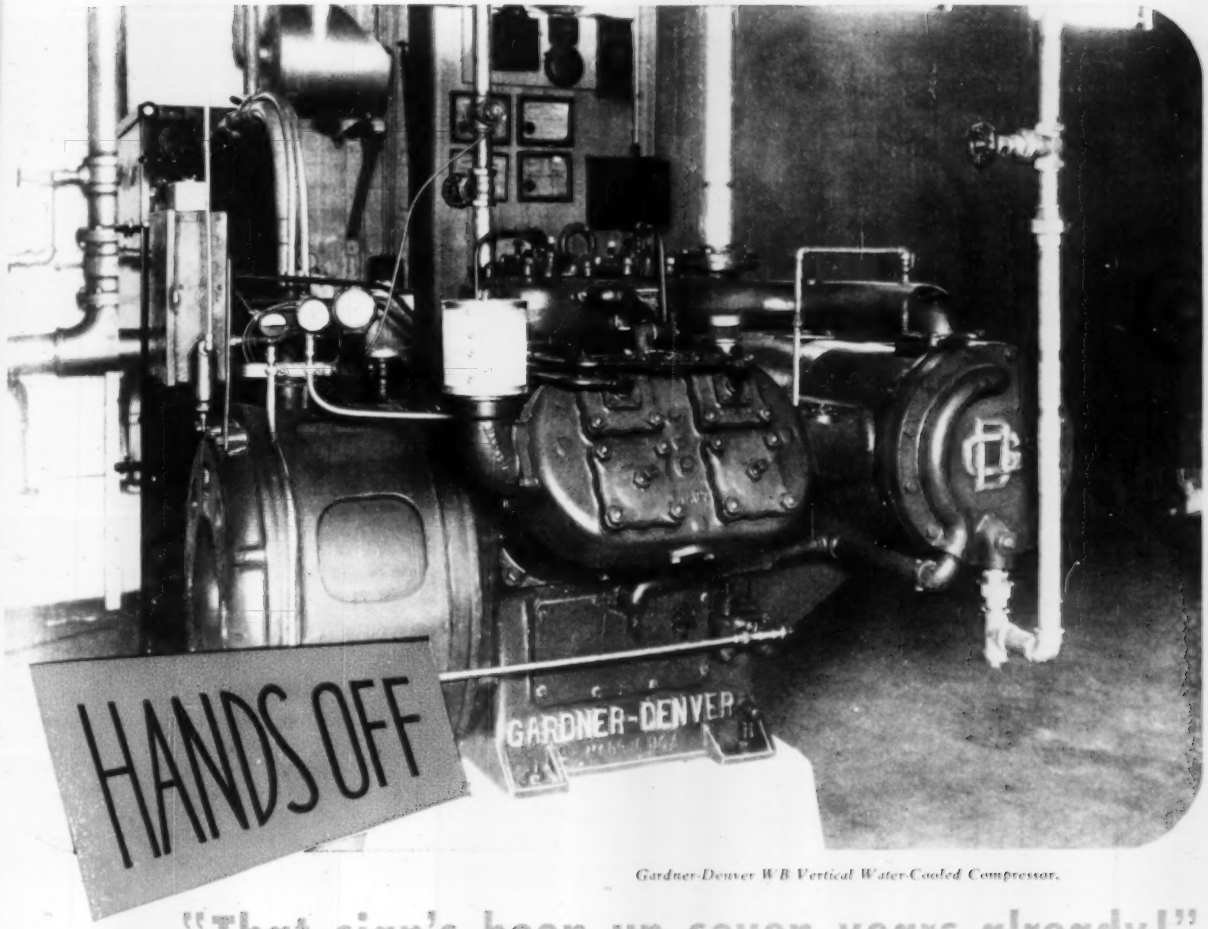
Heavier coats of paint without sagging or running are possible with a line of equipment for spraying paint with superheated steam introduced by Kellogg Division, American Brake Shoe Co., 97 Humboldt St., Rochester 9, N. Y. Finishing material savings of 10-20 per cent can be expected in most applications through reduction of overspray and atomization losses. Using steam as an atomizing medium serves to heat the finishing material and makes it possible to use materials of higher viscosity.

A steam source of at least 100 psi is required and may come from either plant steam or a small steam generator. In addition to the spray guns, it is neccessary to have separators, strainers, traps and regulators as well as a superheater to raise the steam to the required temperature.

Novel Hoist Design

Power for the PT pneumatic hoist placed on the market by Detroit Hoist & Machine Co., 8231 Morrow St., Detroit 11, Mich., is furnished by a rotary vane type air motor even though the unit employs a standard electric hoist mechanism. It is available in lifting capacities of 250 pounds to 1 ton in five sizes.

Hoist is fitted with pendant operated, self-closing control and provides hoisting and lowering speeds in a wide range depending on throttle opening. Air motor is a sliding vane, rotary type using no pistons or re-



Gardner-Denver WB Vertical Water-Cooled Compressor.

"That sign's been up seven years already!"

A Gardner-Denver WB Compressor like this was installed in a midwestern plant seven years ago. It has never been touched since—except to change the oil and take up on the water pump packing. The valves have never been examined—even though the compressor saw 24-hour service much of the time.

Your maintenance men can keep "hands off," too, when you choose a Gardner-Denver WB Air Compressor. And a WB saves space as well as maintenance dollars—gives you big air capacity and high efficiency from a small corner of your plant.

Gardner-Denver WB Compressors are available with water tube intercooler, as shown, or with self-contained radiator intercooler for use where good cooling water is scarce. Send today for bulletin WB-10.

SINCE 1859

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Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

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ciprocating parts. A rotor and four sliding vanes which automatically take up their own wear provide pulseless operation and smooth raising and lowering of the hook and load. Unit is fitted with roller bearings and is fully enclosed. The worm gear drive provides an automatic self-locking, self-contained brake capable of holding full load.

Small Vacuum Furnace

Type 29-0410-18 vacuum furnace made by National Research Corp., 70 Memorial Dr., Cambridge, Mass., is a standard unit operating at high temperature and high vacuum or controlled atmospheres. Operations such as heat treating, sintering, annealing, melting and pouring can all be performed in this unit. Power supply, vacuum pumping system, gages and controls are enclosed in a metal cabinet.

Bell jar is hinged to a vertical base plate with both sides accessible for servicing.

Temperatures up to 2000° C are attainable with standard equipment. Hot zone is 5 inches high by $2\frac{1}{2}$ inches in diameter. Maximum voltage across the standard element is 15 volts.

Joins Mild Steel Sheets

Pickled mild steel sheets up to 28 inches wide can be welded on the PMM2TL mash welding machine made by Sciaky Bros. Inc., 4915 W. 67th St., Chicago 38, Ill. The unit is rated at 150 kva at 50 per cent duty cycle operating on 220 and 440 v, three-phase, 60 cycle. It is supplied as a compact unit including control cabinets integrally mounted and hinged for accessibility.

Machine has a locating and clamping table to automatically locate the sheets to a proper overlap and hold them for the welding operation. Following the welding two steel idling wheels perform a rolling operation which reduces the overlap of the two sheets to a minimum thickness.

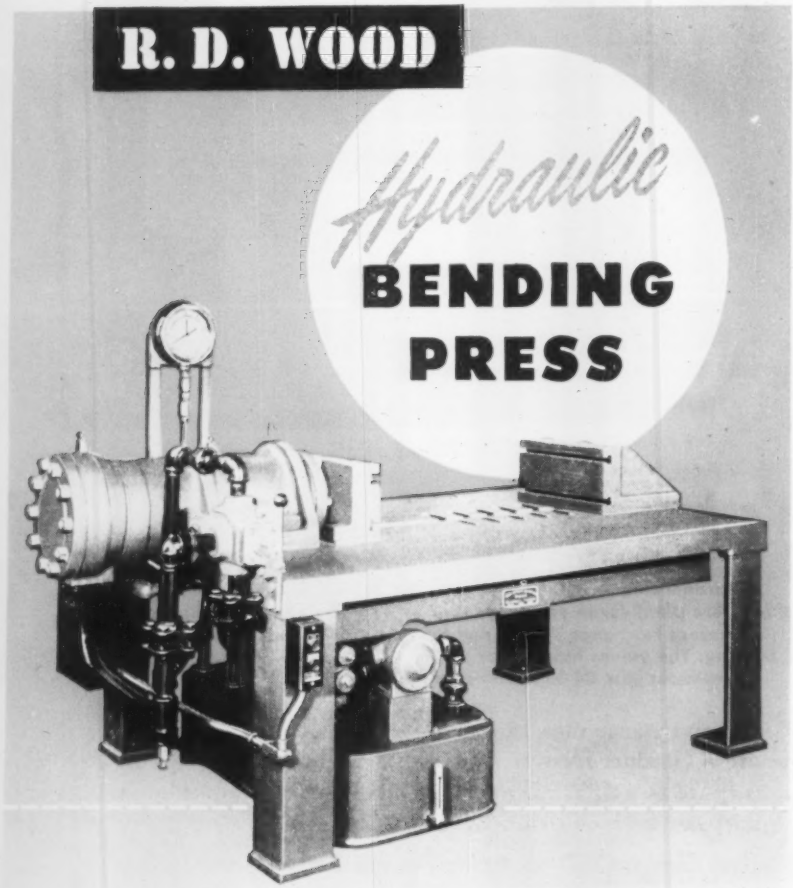
• • •

REDUCE SURFACE TENSION: A new line of welding fluxes, known as Lo-Cost Flotectic fluxes, developed by Eutectic Welding Alloys Corp., New York 13, N. Y., reduce surface tension. Flotectic flux 1100, included in the line, is claimed to reduce silver solder costs by cutting down on amount used per weld; as well as speeding up production by insuring rapid flow with maximum capillary action.

ADJUSTABLE WRENCHES: Four new thin, lightweight, finely balanced adjustable wrenches are offered by Owatonna Tool Co., Owatonna, Minn. Jaws are tapered to permit access into close places, yet are wide and deep enough to obtain a fill bite on either hex or square nuts.

DIMENSIONAL GAGE: Designated as Dimensionair, a new dimensional air gage is announced by Federal Products Corp., Providence 1, R. I. It has a measuring range of 0.003-inch which enables the user to determine the size of a hole before he reaches the ultimate size required. Irregular and tapered holes are more easily gaged.

WIRED-IN RECEPTACLES: Heinemann Electric Co., Trenton, N. J., introduces a special purpose unit consisting of magnetic circuit breakers as well as receptacles in one com-



THIS compact 30-ton horizontal hydraulic press fits productively into general shop use—in the bending and straightening of rods, bars, light structural sections, and for similar work. Self-contained, it is well designed and constructed, with a smooth tool finished 3′ x 4′ steel work table, and 9″ x 18″ ram and resistance heads, machine tee slotted for dies or bending forms. Distance between rams is adjustable in 4″ increments from 1′ to 3′. The press stands 2½′ above the floor at the work table, and occupies an approximate floor space of 7′3″ x 4′6″. Higher capacities and various size tables can be furnished. Write, without obligation, to R. D. Wood Company for additional information.

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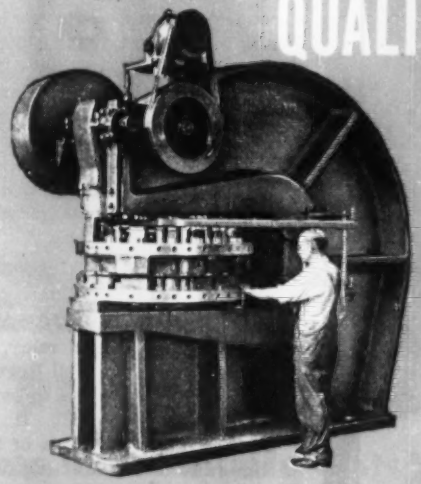
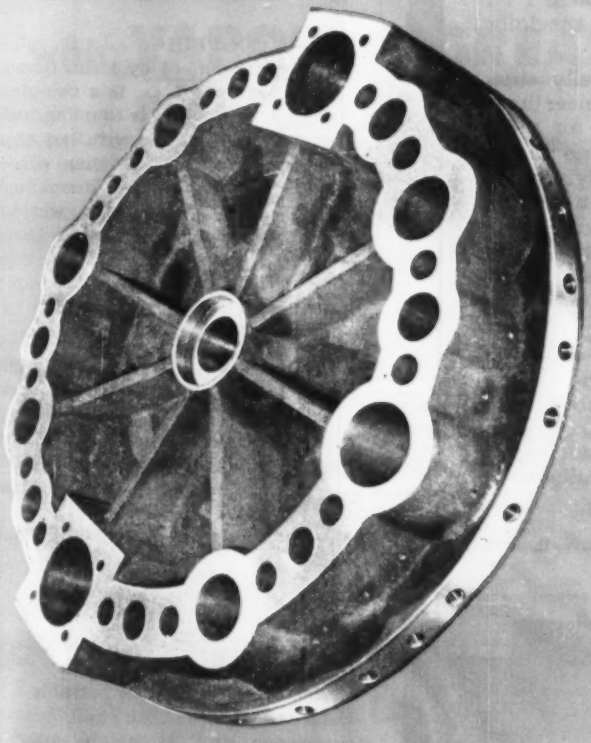


Type R-7, 80 ton Wiedemann turret punch press with 54" diameter MEEHANITE turrets.



Upper Turret Casting for Type R-7 Wiedemann Turret Punch Press. The outside Diameter is 52". The Weight is 2900 lbs. Because the Turrets in Type R-7 Wiedemann Presses must have Great Strength, Fine Machinability and be Non-Porous, MEEHANITE CASTINGS are used for these parts.

SUPPLIED BY—

MEEHANITE CASTINGS

In the manufacture of heavy-duty equipment, Wiedemann Machine Company, Philadelphia, Pa., outlined their requirements as designated above. Upon reviewing these needs as fundamental in the design of certain components of their products, Wiedemann engineers specified Meehanite castings for the turrets and many smaller castings in their line of turret punch presses. Both the press and a close-up view of the Meehanite upper turret casting are shown.

This is another example of the superior engineering properties and recognized quality of Meehanite castings meeting important manufacturing needs. Meehanite means better castings, so whenever you need *better* castings, consult your Meehanite foundry first.

Write for our new sound slide film entitled "Meehanite Castings Serve all Industry," a fast-moving, 30-minute record of Meehanite casting applications.

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American Brake Shoe Co.	Mahwah, New Jersey
The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Continental Gin Co.	Birmingham, Alabama
Crawford & Doherty Foundry Co.	Portland, Oregon
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Johnstone Foundries, Inc.	Grove City, Pennsylvania
Kanawha Manufacturing Co.	Charleston, West Virginia
Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Vulcan Foundry Co.	Oakland, California
Warren Foundry & Pipe Corporation	Phillipsburg, New Jersey

"This advertisement sponsored by foundries listed above."

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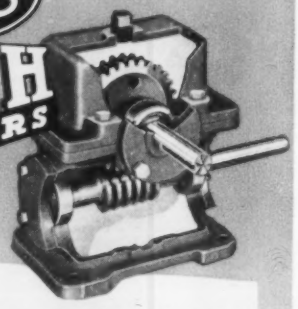
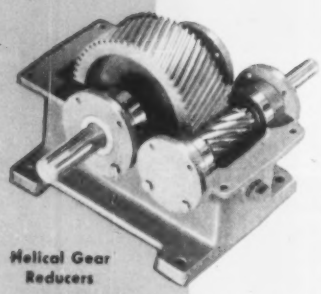
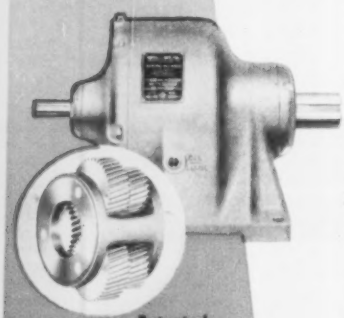


Worm Gear Reducers



Helical Gear Reducers



Patented Differential Gear Reducers

Position or space limitations, imposed on a speed reducer by the design of your equipment, need present no problem . . . need not involve a specially engineered unit.

There's a compact, fully standardized Winsmith reducer (from fractional to 85 H.P.) for practically any condition, no matter how individual. Simplifying your design and installation are extensive Winsmith provisions for horizontal, vertical or flange mounting; diversified shaft positions and alternate directions of rotation.

Such adaptability not only simplifies design problems for the primary equipment maker, but for the user as well. Often, a deficient "special" reducer can be replaced with a fully standard Winsmith model.

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MEMBER OF AGMA

pact enclosure. Receptacles are already wired-in for user's convenience so that only connections necessary are those directly to the line. Equipment is available with one to four fully magnetic breakers in combination with one or two receptacles. Ratings are supplied in any combination up to 50 amp each.

PROTECTS OPERATOR: Protection of operating personnel as well as the connected machine is stressed in a new motor starter, the Motor Watchman, class 10-100-S1, available from Westinghouse Electric Corp., Pittsburgh 30, Pa. With ratings up to 600 v, 7½ hp, polyphase, 5-hp single phase; or 220 v, 1½-hp, dc, it starts, stops and provides overload protection for single phase, polyphase and direct current motors.

RELAY WITH AUTOMATIC RESET: Electr-O-Pulse relay, made by Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa., provides time proportioning control. It regulates heat input by variation of the on-off time ratio of a contacting device with an automatic reset.

QUICK COUPLING: J. S. quick coupling, announced by Mead Cornell & Co., Cleveland 7, O., is a two-piece self-positioning quick coupling unit that opens and closes with less than a quarter turn, in less than a second. It is available in aluminum, high test bronze, stainless steel and Ni-Resist and in sizes from ½ to 6 inches.

FOR BRIGHT FINISHING: Two new types of chromate finishes for bright finishing of zinc plated surfaces have been developed by Allied Research Products Inc., Baltimore, Md. Iridite No. 8P is made in powder form. Iridite No. 12 is a chromate treatment that both passivates and imparts a chrome-like appearance to slated surface.

PORTABLE WELDER: Miller Electric Mfg. Co., Appleton, Wis., offers the new 10 and 20 kva portable spot welder equipped with ball bearing suspension ring. It weighs approximately 80 pounds.

SEALS TUBE SHEET CLOSURES: A new packing and packing installation tool, both special equipment to a

PERFECTION STOVE

reduces maintenance costs . . . gets rapid, thorough cleaning of parts and casings with VAPOR DEGREASING

A fast, efficient cleaning method which fits in well with its conveyorized production system—that's how the Perfection Stove Co. of Cleveland describes Vapor Degreasing. The vapor degreasers, using trichlorethylene solvent, turn out thoroughly cleaned metal parts at an average rate of 3,000 pounds per hour . . . and with a minimum amount of equipment maintenance.

Perfection Stove's three vapor degreasing units remove machine oil and drawing compounds from portable heaters, kerosene range and cook stove parts, screws and other pieces. Vapor Degreasing leaves no spots . . . requires no afterwiping . . . provides an excellent surface for paint adhesion.

The Perfection Stove Co. is only one of many firms throughout the country which are today getting more production and lower costs with this modern cleaning method.

Trichlorethylene Degreasing Solvent

Under various trade marks, Du Pont degreasing solvents have been widely used for many years. These solvents are stable . . . the best yet developed by Du Pont for metal degreasing. They stand up against contaminating and destructive materials which may be introduced in degreasing . . . assist materially in carrying out efficient and economical metal cleaning.

Top picture: Large capacity degreaser handles heavy load of small parts. **Lower picture:** Worker cleaning screw machine parts in small degreasing unit.

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In this helpful literature, you will find detailed information on the advantages of vapor degreasing, the equipment used, the Du Pont degreasing solvents, and many industrial applications. Just clip the coupon below!

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125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
238	388	900	1450	2000
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FREE —*Tempil° "Basic Guide to Ferrous Metallurgy"* — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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new method for sealing tube sheet closures on heat transfer equipment for use with corrosive fluid are introduced by Greene, Tweed & Co., North Wales, Pa. They are offered in a package called the Palmetto tube-seal. Packing itself is of molded composition and is available in compositions that match the service.

ELIMINATES SAND STEMS: Sand Arrester Tube, available from Martin Engineering Co., Kewanee, Ill., is claimed to automatically deliver perfect cores with positive elimination of sand stems. It is available in any desired length with outside diameters ranging from 5/16 to 1¼-inch in ⅛-inch increments.

HAND SERRATING TOOL: An improved hand serrating tool for use with Karbate brand impervious graphite pipe is available from National Carbon Division, Union Carbide & Carbon Corp., New York 17, N. Y. Pipe sizes from 1 to 6 inches inclusive may be serrated.

TRIGGER STOPS: Made of cold finished steel and black penetrate finish is the new line of trigger stops for progressive dies made by Reid Tool Supply Co., Muskegon Heights, Mich. They are available in 3½, 4, 4½ and 5-inch lengths. They are not hardened and can be readily drilled in location desired for installation in the die.

DIAMOND ABRASIVE BELTS: Hartford Special Machinery Co., Hartford 12, Conn., announces a new diamond abrasive belt for use on carbide dies from ¼ to 9 inches ID. Belts are made of solid nylon impregnated with diamond abrasive in grades from 1-5 microns to a sieve or mesh size of 100. They are not affected by humidity and can be cleaned by washing in warm soap and water. They are also impervious to oil.

FILTERING MEMBRANE: A new type of filtering membrane for its line of industrial filters is offered by Titeflex Inc., Newark, N. J. Designated as Well-Screen membrane, it is used within the filter itself to support the filter cake which is the actual filtration medium. They are available in various sizes and can be provided in any alloy which can be drawn into wire.

UNLOADING VALVE: Model 8826 unloading valve, announced by Rivett Lathe & Grinder Inc., Boston, Mass., features a balance piston design for close accurate fit in the valve bore. It is used in oil hydraulic circuits to unload one part of the circuit at no back pressure to the tank. Valve is operated by pilot pressure from some other part of the circuit.

HEAT RESISTANT PAINT: Known as Heat-Rem H-170, a new high heat resistant aluminum paint is announced by Speco Inc., Cleveland 9, O. Capable of withstanding temperatures up to 1700° F, it utilizes a silicone base and fuses with surface metal immediately upon application. It forms a bright, elastic finish resistant to moisture, corrosion, mild acids, alkalis and industrial fumes.

PILLOW BLOCKS: Known as Safety-Vent-Seal, a specially designed labyrinth seal which automatically provides the correct amount of lubricant, is a feature of the new self-aligning, precision ball bearing pillow blocks and flanged cartridges offered by Boston Gear Works, Quincy Mass. They are available in shaft diameters from ½ to 1¼ inches.

TRANSFERS FLUIDS: Speed - Flo transfer pump, model 82230, made by Lincoln Engineering Co., St. Louis, Mo., transfers fluids at rate of 22 gallons per minute. The high speed, air operated pump fits all 2-inch opening drums. It has a built-in, disk type precision flow regulator to permit finger-tip regulation of volume of output.

GIVES ALARM: Autocon Hi-Level safety switch, made by Automatic Control Co., St. Paul 4, Minn., is a non-float, non-electrode device that is not affected by low temperatures. Only ½-inch rise in water level compresses air in bell chamber which operates switch to set off either audible or visual alarm.

FOR MORE INFORMATION

on the new products and equipment in this section write to Readers' Service Dept., STEEL, Penton Bldg., Cleveland 13, O. It will receive prompt attention.

The Market Outlook

RAW STEEL poured from the furnaces in unprecedented volume last week. Record-breaking 2,025,000 net tons of ingots were produced, steelmaking operations averaging 101.5 per cent of national capacity. Production of finished steel, however, is not keeping pace. Combination of labor trouble and severe winter weather is holding back finishing mill operations, and toward the end of last week some curtailment of blast furnace, open-hearth and coke oven operations was under way. Output at several important steel centers is curtailed due to industrial gas shutoffs occasioned by the cold weather, and by transport interruptions in and out of plants resulting from the wildcat "illness" strike of railroad switchmen. Metalworking operations are similarly hampered.

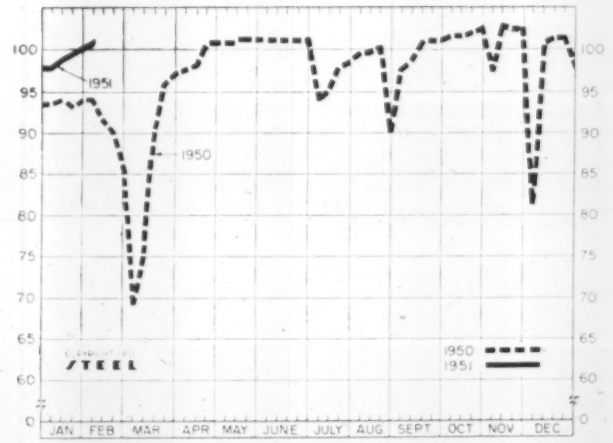
ALLOCATIONS—Extension of existing allocation programs into May and inauguration of additional programs that month are expected to be made by the NPA Steel Task Committee about Feb. 13. It had been thought action would be taken by that date to get the new programs under way by April. However, the trend now appears to be to shape allocations so that a Controlled Materials Plan can be put into effect in July with least possible disruption of schedules. Second quarter will see a sharp upswing in steel rolling for defense and related needs. The locomotive and oil country goods programs will likely get under way in May on a month-to-month basis. Ship repair needs will be set up similarly, it is thought. New ship construction needs probably will be placed on DO priority. Requirements for railroad cars and lake ore vessels are scheduled for April only, and may be handled on a monthly basis over remainder of second quarter.

MILITARY NEEDS—Munitions contracts and defense steel requirements are snowballing. In addition to a diversity of orders for combat tanks, military vehicles, Signal Corps apparatus and airplane equipment already placed, still heavier orders of this character are in early prospect. Shell requirements are being stepped up with one large program on the verge of being placed. Ship work is beginning to stir, bids having just been closed on cargo vessels requiring 225,000 tons of hull steel.

SUPPLY—Steelmakers' order books are loaded with DO-rated tonnage, some extending into third quarter. Volume is rising steadily with corresponding shrinkage in civilian supplies. Sharp curtailment of commercial production looms ahead but cutbacks to date have been moderate. Manufacturers are using more premium-priced steel obtained in the gray market and from importers, and they are resorting to substitute materials where possible. But government bans on use of certain scarce metals will force curtailments shortly, to say nothing of possible arbitrary government regulations limiting output of civilian goods.

PRICES—Freeze of prices by the government has resulted in no noticeable change in the situation as it applies to steel products. Current quotations were established before the deadline set by ESA. Further clarification of the situation is indicated but whether changes from present schedules will be forced is unknown. Rollback of iron and steel scrap prices by several dollars a ton is expected momentarily along with imposition of government controls on the lines of the old OPA system of base prices with district and grade price differentials applying. An upward adjustment of possibly 25 to 50 cents per ton on coal and coke is thought likely to compensate for the increase in miners' wages allowed to become effective Feb. 1.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Feb. 3	Change	Same Week 1950	Same Week 1949
Pittsburgh	99.5	1*	94.5	97
Chicago	100.5	1.5	97.5	99.5
Eastern Pa.	101	1.5	84	97
Youngstown	106	0	97	105
Wheeling	97	1.5	101	93
Cleveland	102	1.5*	97.5	102
Buffalo	104	0	101.5	104
Birmingham	100	0	100	100
New England	92	0	78	87
Cincinnati	101	2	101	105
St. Louis	90.5	2.5	89	84.5
Detroit	109	1.5*	107	102
Western	103	2*	90	
Estimated national rate	101.5	1.5	94	100

Based on weekly steelmaking capacity of 1,999,035 net tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

* Change from revised rate for preceding week.

The Metalworking Outlook—p. 39 Production-Engineering News—p. 75

Composite Market Averages

	Feb. 1 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	171.92	173.92	171.92	156.13	106.82
Index in cents per lb.	4.657	4.657	4.657	4.230	2.894
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.00	$106.00	$105.55	$93.00	$58.27
No. 2 Fdry. Pig Iron, GT	52.34	52.34	52.34	46.22	25.42
Basic Pig Iron, GT	52.16	52.16	52.16	46.42	24.75
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT	47.17	46.50	45.50	27.33	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 6-year base period 1935-39: Structural shapes; plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Feb. 1 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.25
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.25
Bars, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.57
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10-15	2.75
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.10
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.10
Shapes, del. Philadelphia	3.90	3.90	3.90	3.46	2.215
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.25
Plates, Chicago	3.70	3.70	3.70	3.50	2.25
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.25
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.25
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.25
Sheets, H.R., Pittsburgh	3.60-75	3.60-75	3.60-75	3.35	2.20
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.20
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.05
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.05
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.15
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	3.70
Strip, H.R., Pittsburgh	3.75-4.00	3.75-4.00	3.75-4.00	3.25	2.10
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.10
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.15	2.80
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	2.90
Strip, C.R., Detroit	4.35-5.60	4.35-5.60	4.35-5.60	4.35-40	2.90
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.50	2.75
Nails, Wire, Pittsburgh	5.90-6.20	5.90-6.20	5.90-6.20	5.30	2.60
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.00

SEMIFINISHED

Billets, forging, Pitts (NT)	$66.00	$66.00	$66.00	$63.00	$42.00
Wire rods, ⅜-⅝", Pitts.	4.10-30	4.10-30	4.10-30	3.85	2.15

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$26.25
Basic, Valley	52.00	52.00	52.00	46.00	25.25
Basic, del. Phila.	56.39	56.39	56.39	49.44	27.09
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Del. Phila.	56.89	56.89	56.89	49.94	27.59
No. 2 Fdry, Birm.	48.88	48.88	48.88	39.38-42.38	22.13
No. 2 Fdry (Birm.) del. Cin.	55.58	55.58	55.58	46.08	25.81
Malleable Valley	52.50	52.50	52.50	46.50	25.75
Malleable, Chicago	52.50	52.50	52.50	46.50	25.75
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt, Pitts.	$51.50	$46.50	$46.50	$31.25	$20.00
No. 1 Heavy Melt, E. Pa.	47.50	47.50	45.00	29.25	18.75
No. 1 Heavy Melt, Chicago	45.00	45.00	45.00	27.50	18.75
No. 1 Heavy Melt, Valley	51.25	46.25	46.25	31.25	20.00
No. 1 Heavy Melt, Cleve.	50.75	45.75	45.75	28.25	19.50
No. 1 Heavy Melt, Buffalo	51.50	51.50	44.88	27.75	19.25
Rails, Rerolling, Chicago	67.00	67.00	67.00	39.50	22.25
No. 1 Cast, Chicago	62.00	62.00	63.00	40.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$14.75	$14.75	$14.75	$13.25	$7.50
Beehive, Fdry., Connlsvl.	17.50	17.50	17.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	9.75	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	6.35
Tin, New York	183.00	183.00	157.00	74.25	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex.	42.00	42.00	32.00	27.25	14.50
Nickel, refinery, duty paid	50.50	50.50	50.50	40.00	35.00

Pig Iron

For key to producing companies, turn next page. Minimum delivered prices do not include 3% federal t

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., B2	$54.00	$54.50	$55.00	$53.50
Brooklyn, N.Y., del.	....	58.79	59.29	....
Newark, del.	56.63	57.13	57.63	58.13
Philadelphia, del.	56.39	56.89	57.39	57.89
Birmingham District				
Alabama City, Ala., R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala., W15	48.38	48.88	....	....
Cincinnati, del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y., W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y., T9	....	52.50	53.00	....
Boston, del.	61.26	61.76	62.20	....
Rochester, N.Y., del.	54.63	55.13	55.63	....
Syracuse, N.Y., del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
Indiana Harbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill., Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	53.89	54.39	54.39	54.89
Muskegon, Mich., del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain, O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	53.25	53.75	....
Fontana, Calif. K1	58.00	58.50	....	....
Geneva, Utah G1	52.00	52.50	....	....
Seattle, Tacoma, Wash., del.	....	60.20	....	....
Portland, Oreg., del.	....	60.20	....	....
Los Angeles, San Francisco, del.	59.70	60.20	....	....
Granite City, Ill. K7	53.90	54.40	54.90	....
St. Louis, del. (inc. tax)	54.65	55.15	55.65	....
Ironton, Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
Neville Island, Pa. P6	....	52.50	52.50	53.00
Pitts., N.&S. sides, Ambridge, Aliquippa, del.	....	53.69	53.69	54.19
McKees Rocks, del.	....	53.45	53.45	53.95
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	53.94	53.94	54.44
Verona, del.	....	54.40	54.40	54.90
Brackenridge, del.	....	54.63	54.63	55.13
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	....	....
Sharpsville, Pa. S6	....	....	52.50	53.00
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.01	57.51	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson, O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

Niagara Falls, N.Y. P15	$83.00
Keokuk, Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles, Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia delivered	63.00
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL Feb. 1, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company, key on next two pages.

INGOTS, Carbon, Forging (NT)

Forging, Calif. K1 ... $79.00
Forging, Pa. U5 ... 52.00

INGOTS, Alloy (NT)

Forging, R7 ... $54.00
Forging, Calif. K1 ... 80.00
Forging, Tex. S5 ... 62.00
Forging, Pa. C18 ... 54.00
Forging, Pa. U5 ... 54.00
Forging, Duquesne, Pa. U5 ... 54.00

BILLETS, BLOOMS & SLABS

Carbon, Reroiling (NT)

Bessemer, Pa. U5 ... $56.00
Clairton, Pa. U5 ... 56.00
Ensley, Ala. T2 ... 56.00
Fairfield, Ala. T2 ... 56.00
Fontana, Calif. K1 ... 75.00
Gary, Ind. U5 ... 56.00
Johnstown, Pa. B2 ... 56.00
Lackawanna, N.Y. B2 ... 56.00
Munhall, Pa. U5 ... 56.00
So. Chicago, Ill. U5 ... 56.00
So. Duquesne, Pa. U5 ... 56.00

Carbon, Forging (NT)

Bessemer, Pa. U5 ... $66.00
Buffalo R2 ... 66.00
Canton, O. R2 ... 66.00
Clairton, Pa. U5 ... 66.00
Cleveland R2 ... 66.00
Conshohocken, Pa. A3 ... 73.00
Detroit R7 ... 69.00
Ensley, Ala. T2 ... 66.00
Fairfield, Ala. T2 ... 66.00
Fontana, Calif. K1 ... 85.00
Gary, Ind. U5 ... 66.00
Geneva, Utah G1 ... 66.00
Houston, Tex. S5 ... 74.00
Johnstown, Pa. B2 ... 66.00
Lackawanna, N.Y. B2 ... 66.00
Los Angeles B3 ... 85.00
Munhall, Pa. U5 ... 66.00
Seattle B3 ... 85.00
So. Chicago R2, U5, W14 ... 66.00
So. Duquesne, Pa. U5 ... 66.00
So. San Francisco B3 ... 85.00

Alloy, Forging (NT)

Bethlehem, Pa. B2 ... $70.00
Buffalo R2 ... 70.00
Canton, O. R2 ... 70.00
Canton, O. (29) T7 ... 66.00
Conshohocken, Pa. A3 ... 77.00
Detroit R7 ... 73.00
Fontana, Calif. K1 ... 89.00
Gary, Ind. U5 ... 70.00
Houston, Tex. S5 ... 78.00
Ind. Harbor, Ind. Y1 ... 70.00
Johnstown, Pa. B2 ... 70.00
Lackawanna, N.Y. B2 ... 70.00
Los Angeles B3 ... 90.00
Massillon, O. R2 ... 70.00
Midland, Pa. C18 ... 70.00
Munhall, Pa. U5 ... 70.00
So. Chicago R2, U5, W14 ... 70.00
So. Duquesne, Pa. U5 ... 70.00
Struthers, O. Y1 ... 70.00
Warren, O. C17 ... 70.00

ROUNDS, SEAMLESS TUBE (NT)

Canton, O. R2 ... $82.00
Cleveland R2 ... 82.00
Fontana, Calif. K1 ... 103.00
Gary, Ind. U5 ... 82.00
Massillon, O. R2 ... 82.00
So. Chicago, Ill. R2 ... 82.00
So. Duquesne, Pa. U5 ... 82.00

SHEET BARS (NT)

Fontana, Calif. K1 ... $89.00

SKELP

Aliquippa, Pa. J5 ... 3.45
Munhall, Pa. U5 ... 3.35
Warren, O. R2 ... 3.35
Youngstown R2, U5 ... 3.35

WIRE RODS

Alabama City, Ala. R2 ... 4.10
Buffalo W12 ... 4.10
Cleveland A7 ... 4.10
Donora, Pa. A7 ... 4.10
Fairfield, Ala. T2 ... 4.10
Fontana, Calif. K1 ... 4.90
Houston, Tex. S5 ... 4.50
Johnstown, Pa. B2 ... 4.10
Joliet, Ill. A7 ... 4.10
Los Angeles B3 ... 4.90
Minnequa, Colo. C10 ... 4.35
Monessen, Pa. P7 ... 4.30
No. Tonawanda, N.Y. B11 ... 4.10
Pittsburg, Calif. C11 ... 4.75
Portsmouth, O. P12 ... 4.30
Roebling, N.J. R5 ... 4.20
So. Chicago, Ill. R2 ... 4.10
Sparrows Point, Md. B2 ... 4.20
Sterling, Ill. (1) N15 ... 4.10
Struthers, O. Y1 ... 4.10
Torrance, Calif. C11 ... 4.90
Worcester A7 ... 4.40

STRUCTURALS

Carbon Steel Stand. Shapes

Alabama City, Ala. R2 ... 3.60
Aliquippa, Pa. J5 ... 3.65
Bessemer, Ala. T2 ... 3.60
Bethlehem, Pa. B2 ... 3.70
Clairton, Pa. U5 ... 3.65
Fairfield, Ala. T2 ... 3.65
Fontana, Calif. K1 ... 4.25
Gary, Ind. U5 ... 3.65
Geneva, Utah G1 ... 3.65
Houston, Tex. S5 ... 4.05
Ind. Harbor, Ind. I-2 ... 3.65
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.25
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.25
Minnequa, Colo. C10 ... 4.10
Munhall, Pa. U5 ... 3.65
Niles, Calif. (22) P1 ... 4.85
Phoenixville, Pa. P4 ... 4.95
Portland, Oreg. O4 ... 4.50
Seattle B3 ... 4.30
So. Chicago, Ill. U5, W14 ... 3.65
So. San Francisco B3 ... 4.20
Torrance, Calif. C11 ... 4.25
Weirton, W.Va. W6 ... 3.90

Alloy Stand. Shapes

Clairton, Pa. U5 ... 4.35
Fontana, Calif. K1 ... 5.55
Munhall, Pa. U5 ... 4.35
So. Chicago, Ill. U5 ... 4.35

H.S., L.A. Stand. Shapes

Aliquippa, Pa. J5 ... 5.50
Bessemer, Ala. T2 ... 5.50
Bethlehem, Pa. (14) B2 ... 5.50
Clairton, Pa. U5 ... 5.50
Fairfield, Ala. T2 ... 5.50
Fontana, Calif. K1 ... 6.10
Gary, Ind. U5 ... 5.50
Geneva, Utah G1 ... 5.50
Ind. Harbor, Ind. I-2 ... 5.50
Ind. Harbor, Ind. Y1 ... 6.00
Johnstown, Pa. B2 ... 5.50
Lackawanna, N.Y. (14) B2 ... 5.50
Los Angeles B3 ... 6.05
Munhall, Pa. U5 ... 5.50
Seattle B3 ... 6.10
So. Chicago, Ill. U5 ... 5.50
So. San Francisco B3 ... 6.00
Struthers, O. Y1 ... 6.00

Wide Flange

Bethlehem, Pa. B2 ... 3.70
Fontana, Calif. K1 ... 4.65
Lackawanna, N.Y. B2 ... 3.70
Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

H.S., L.A. Wide Flange

Bethlehem, Pa. B2 ... 5.50
Lackawanna, N.Y. B2 ... 5.50
Munhall, Pa. U5 ... 5.45
So. Chicago, Ill. U5 ... 5.45

SHEET STEEL PILING

Ind. Harbor, Ind. I-2 ... 4.45
Lackawanna, N.Y. B2 ... 4.45
Munhall, Pa. U5 ... 4.45
So. Chicago, Ill. U5 ... 4.45

BEARING PILES

Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

PLATES, High-Strength Low-Alloy

Aliquippa, Pa. J5 ... 5.65
Bessemer, Ala. T2 ... 5.65
Clairton, Pa. U5 ... 5.65
Cleveland J5, R2 ... 5.65
Conshohocken, Pa. A3 ... 5.90
Ecorse, Mich. G5 ... 5.85
Fairfield, Ala. T2 ... 5.65
Fontana, Calif. (30) K1 ... 6.25
Gary, Ind. U5 ... 5.65
Geneva, Utah G1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.65
Ind. Harbor, Ind. Y1 ... 6.15
Johnstown, Pa. B2 ... 5.65
Munhall, Pa. U5 ... 5.65
Pittsburgh J5 ... 5.65
Seattle B3 ... 6.55
Sharon, Pa. S3 ... 5.70
So. Chicago, Ill. U5 ... 5.65
Sparrows Point, Md. B2 ... 5.65
Warren, O. R2 ... 5.65
Youngstown Y1 ... 6.15

PLATES, Open-Hearth Alloy

Claymont, Del. W16 ... 4.85
Coatesville, Pa. L7 ... 5.25
Conshohocken, Pa. A3 ... 5.05
Fontana, Calif. K1 ... 5.70
Gary, Ind. U5 ... 4.75
Johnstown, Pa. B2 ... 4.75
Munhall, Pa. U5 ... 4.75
Sharon, Pa. S3 ... 5.20
So. Chicago, Ill. U5 ... 4.75
Sparrows Point, Md. B2 ... 4.75

FLOOR PLATES

Cleveland J5 ... 4.75
Conshohocken, Pa. A3 ... 4.75
Harrisburg, Pa. C5 ... 5.95
Ind. Harbor, Ind. I-2 ... 4.75
Munhall, Pa. U5 ... 4.75
So. Chicago, Ill. U5 ... 4.75

PLATES, Carbon Steel

Alabama City, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Ashland, Ky. (15) A10 ... 3.70
Bessemer, Ala. T2 ... 3.70
Clairton, Pa. U5 ... 3.70
Claymont, Del. W16 ... 4.15
Cleveland J5, R2 ... 3.70
Coatesville, Pa. L7 ... 4.15
Conshohocken, Pa. A3 ... 4.15
Ecorse, Mich. G5 ... 3.75
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. (30) K1 ... 4.30
Gary, Ind. U5 ... 3.70
Granite City, Ill. G4 ... 4.40
Geneva, Utah G1 ... 3.70
Harrisburg, Pa. C5 ... 4.95
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Minnequa, Colo. C10 ... 4.50
Munhall, Pa. U5 ... 3.70
Pittsburgh J5 ... 3.70
Seattle B3 ... 4.60
Sharon, Pa. S3 ... 3.95
So. Chicago, Ill. U5, W14 ... 3.70
Sparrows Point, Md. B2 ... 3.70
Steubenville, O. W10 ... 3.70
Warren, O. R2 ... 3.70
Weirton, W.Va. W6 ... 4.00
Youngstown R2, U5, Y1 ... 3.70

PLATES, Carbon A.R.

Fontana, Calif. K1 ... 5.45
Geneva, Utah G1 ... 4.85

PLATES, Wrought Iron

Economy, Pa. B14 ... 8.60

PLATES, Ingot Iron

Ashland, c.l. (15) A10 ... 3.95
Ashland, lcl. (15) A10 ... 4.45
Cleveland, c.l. R2 ... 4.30
Warren, O. c.l. R2 ... 4.30

BARS, Hot-Rolled Carbon

Alabama City, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Alton, Ill. (1) L1 ... 3.95
Atlanta, Ga. A11 ... 4.25
Bessemer, Ala. T2 ... 3.70
Buffalo R2 ... 3.70
Canton, O. R2 ... 3.70
Clairton, Pa. U5 ... 3.70
Cleveland R2 ... 3.70
Detroit R7 ... 3.85
Ecorse, Mich. G5 ... 3.65
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2 Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.15
Niles, Calif. P1 ... 5.05
N. Tonawanda, N.Y. B11 ... 3.70
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland, Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So. Chicago R2, U5, W14 ... 3.70
So. Duquesne, Pa. U5 ... 3.70
So. San Fran., Cal. B3 ... 4.45
Struthers, O. Y1 ... 3.70
Torrance, Calif. C11 ... 4.40
Weirton, W.Va. W6 ... 3.85
Youngstown R2, U5 ... 3.70

BAR SIZE ANGLES, S. SHAPES

Aliquippa, Pa. J5 ... 3.70
Atlanta A11 ... 4.25
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Niles, Calif. P1 ... 5.05
Portland, Oreg. O4 ... 4.65
San Francisco S7 ... 4.85

BAR SIZE ANGLES, H.R. CARBON

Bethlehem, Pa. B2 ... 3.90

BARS, Hot-Rolled Alloy

Bethlehem, Pa. B2 ... 4.30
Buffalo R2 ... 4.30
Canton, O. R2 ... 4.30
Canton, O. (29) T7 ... 3.95
Clairton, Pa. U5 ... 4.30
Detroit R7 ... 4.45
Ecorse, Mich. G5 ... 4.25
Fontana, Calif. K1 ... 5.35
Gary, Ind. U5 ... 4.30
Houston, Tex. S5 ... 4.70
Ind. Harbor, Ind. I-2, Y1 ... 4.30
Johnstown, Pa. B2 ... 4.30
Kansas City, Mo. S5 ... 4.90
Lackawanna, N.Y. B2 ... 4.30
Los Angeles B3 ... 5.35
Massillon, O. R2 ... 4.30
Midland, Pa. C18 ... 4.30
So. Chicago R2, U5, W14 ... 4.30
So. Duquesne, Pa. U5 ... 4.30
Struthers, O. Y1 ... 4.30
Warren, O. C17 ... 4.30
Youngstown U5 ... 4.30

BAR SHAPES, Hot-Rolled Alloy

Clairton, Pa. U5 ... 4.55
Gary, Ind. U5 ... 4.55
Youngstown U5 ... 4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa, Pa. J5 ... 5.55
Bessemer, Ala. T2 ... 5.55
Bethlehem, Pa. B2 ... 5.55
Clairton, Pa. U5 ... 5.55
Cleveland R2 ... 5.55
Fairfield, Ala. T2 ... 5.55
Fontana, Calif. K1 ... 6.60
Gary, Ind. U5 ... 5.55
Ind. Harbor, Ind. I-2 ... 5.55
Indiana Harbor, Ind. Y1 ... 6.05
Johnstown, Pa. B2 ... 5.55
Lackawanna, N.Y. B2 ... 5.55
Los Angeles B3 ... 6.25
Pittsburgh J5 ... 5.55
Seattle B3 ... 6.30
So. Duquesne, Pa. U5 ... 5.55
So. San Francisco B3 ... 6.30
Struthers, O. Y1 ... 6.05
Youngstown U5 ... 5.55

BARS, Cold-Finished Carbon

Ambridge, Pa. W18 ... 4.55
Beaver Falls, Pa. M12 R2 ... 4.55
Buffalo B5 ... 4.60
Camden, N.J. P13 ... 5.00
Carnegie, Pa. C12 ... 4.55
Chicago W18 ... 4.55
Cleveland A7, C20 ... 4.55
Detroit P17 ... 4.70
Donora, Pa. A7 ... 4.55
Elyria, O. W8 ... 4.55
Franklin Park, Ill. N5 ... 4.55
Gary, Ind. R2 ... 4.55
Green Bay, Wis. F7 ... 4.55
Hammond, Ind. L2, M13 ... 4.55
Hartford, Conn. R2 ... 5.10
Harvey, Ill. B5 ... 4.55
Los Angeles R2 ... 6.00
Mansfield, Mass. B5 ... 5.10
Massillon, O. R2, R8 ... 4.55
Midland, Pa. C18 ... 4.55
Monaca, Pa. S17 ... 4.55
Newark, N.J. W18 ... 5.00
Plymouth, Mich. P5 ... 4.80
Pittsburgh J5 ... 4.55
Putnam, Conn. W18 ... 5.10
Readville, Mass. C14 ... 5.10
St. Louis, Mo. M5 ... 4.95
So. Chicago, Ill. W14 ... 4.55
Spring City, Pa. (5) K3 ... 5.00
Struthers, O. Y1 ... 4.55
Waukegan, Ill. A7 ... 4.55
Youngstown F3, Y1 ... 4.55

BARS, Cold-Finished Alloy

Ambridge, Pa. W18 ... 5.40
Beaver Falls, Pa. M12 ... 5.40
Bethlehem, Pa. B2 ... 5.40
Buffalo B5 ... 5.40
Camden, N.J. P13 ... 5.80
Canton, O. R2 ... 5.40
Canton, O. (29) T7 ... 4.90
Carnegie, Pa. C12 ... 5.40
Chicago W18 ... 5.40
Cleveland A7 ... 5.45
Cleveland C20 ... 5.40
Detroit P17 ... 5.55
Donora, Pa. A7 ... 5.45
Elyria, O. W8 ... 5.40
Gary, Ind. R2 ... 5.40
Hammond, Ind. L2, M13 ... 5.40
Hartford, Conn. R2 ... 5.85
Harvey, Ill. B5 ... 5.40
Lackawanna, N.Y. B2 ... 5.40
Mansfield, Mass. B5 ... 5.85
Massillon, O. R2, R8 ... 5.40
Midland, Pa. C18 ... 5.40
Monaca, Pa. S17 ... 5.40
Newark, N.J. W18 ... 5.75
Plymouth, Mich. P5 ... 5.60
So. Chicago, Ill. R2, W14 ... 5.40
Struthers, O. Y1 ... 5.40
Warren, O. C17 ... 5.40
Waukegan, Ill. A7 ... 5.45
Worcester, Mass. A7 ... 5.75
Youngstown F3, Y1 ... 5.40

RAIL STEEL BARS

Chicago Hts. (3, 4) I-2 C2 ... 4.75
Franklin, Pa. (3, 4) F5 ... 4.75
Fort Worth, Tex. (26) T4 ... 5.40
Huntngtn, W.Va. (3) W7 ... 5.50
Marion, O. (3) P11 ... 4.75
Moline, Ill. (3) R2 ... 3.80
Tonawanda (3, 4) B12 ... 4.75
Williamsport (3) S19 ... 5.00
Williamsport (4) S19 ... 5.10

BARS, Wrought Iron

Dover, N.J. (Staybolt) U1 ... 15.00
Dover (Eng. Bolt) U1 ... 13.50
Dover (Wrgt. Iron) U1 ... 12.25
Economy, Pa. (S.R.) B14 ... 9.60
Economy, Pa. (D.R.) B14 ... 11.90
Economy (Staybolt) B14 ... 12.20
McK. Rks. (Staybolt) L5 ... 14.50
McK. Rks. (S.R.) L5 ... 9.60
McK. Rks. (D.R.) L5 ... 13.00

BARS, Reinforcing (Fabricators)

Alabama City, Ala. R2 ... 3.70
Alton, Ill. (6) L1 ... 3.70
Atlanta A11 ... 4.25
Buffalo R2 ... 3.70
Cleveland R2 ... 3.70
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.50
Niles, Calif. P1 ... 5.05
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland, Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So. Chicago, Ill. R2 ... 3.70
So. Duquesne, Pa. U5 ... 3.70
So. San Francisco B3 ... 4.45
Sparrows Point, Md. B2 ... 3.70
Struthers, O. Y1 ... 3.70
Torrance, Calif. C11 ... 4.40
Youngstown R2, U5 ... 3.70

BARS, Reinforcing

(Fabricated; to Consumers)

Huntington, W.Va. W7 ... 5.50
Johnstown, ¾-1" B2 ... 4.75
Los Angeles B3 ... 5.45
Marion, O. P11 ... 5.00
Seattle B3, N14 ... 5.55
So. San Francisco B3 ... 5.45
Sparrows Pt. ¾-1" B2 ... 4.75
Williamsport, Pa. S19 ... 5.10

SHEETS, Hot-Rolled Steel

(18 gage and heavier)

Alabama City, Ala. R2 ... 3.60
Ashland, Ky. (8) A10 ... 3.60
Butler, Pa. A10 ... 3.60
Cleveland J5, R2 ... 3.60
Conshohocken, Pa. A3 ... 4.00
Detroit M1 ... 4.40
Ecorse, Mich. (8) G5 ... 3.80
Fairfield, Ala. T2 ... 3.60
Fontana, Calif. K1 ... 4.55
Gary, Ind. U5 ... 3.60
Geneva, Utah G1 ... 3.70
Granite City, Ill. G4 ... 4.30
Ind. Harbor, Ind. I-2, Y1 ... 3.60
Irvin, Pa. U5 ... 3.60
Lackawanna, N.Y. B2 ... 3.60
Munhall, Pa. U5 ... 3.60
Niles, O. N12 ... 5.25
Pittsburg, Calif. C11 ... 4.30
Pittsburgh J5 ... 3.60
Sharon, Pa. S3 ... 4.00
So. Chicago, Ill. W14 ... 3.60
Sparrows Point, Md. B2 ... 3.60
Steubenville, O. W10 ... 3.60
Torrance, Calif. C11 ... 4.30
Warren, O. R2 ... 3.60
Weirton, W.Va. W6 ... 3.60
West Leechburg, Pa. A4 ... 3.75
Youngstown U5, Y1 ... 3.60

SHEETS, H-R (19 gage)

Alabama City, Ala. R2 ... 4.75
Dover, O. R1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.40
Mansfield, O. E6 ... 5.65
Niles, O. N12 ... 5.75
Torrance, Calif. C11 ... 5.40

SHEETS, H-R (14-ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2 ... 5.40
Conshohocken, Pa. A3 ... 5.65
Ecorse, Mich. G5 ... 5.50
Fairfield, Ala. T2 ... 5.40
Fontana, Calif. K1 ... 6.35
Gary, Ind. U5 ... 5.40
Ind. Harbor, Ind. I-2 ... 5.40
Indiana Harbor, Ind. Y1 ... 5.90
Irvin, Pa. U5 ... 5.40
Lackawanna (35) B2 ... 5.40
Pittsburgh J5 ... 5.40
Sharon, Pa. S3 ... 5.40
So. Chicago, Ill. U5 ... 5.40
Sparrows Point (36) B2 ... 5.40
Warren, O. R2 ... 5.40
Weirton, W.Va. W6 ... 5.75
Youngstown U5 ... 5.40
Youngstown Y1 ... 5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ... 6.55
Ecorse, Mich. G5 ... 6.65
Fontana, Calif. K1 ... 7.50
Gary, Ind. U5 ... 6.55
Indiana Harbor, Ind. Y1 ... 7.05
Indiana Harbor, Ind. I-2 ... 6.55
Irvin, Pa. U5 ... 6.55
Lackawanna (37) B2 ... 6.55
Pittsburgh J5 ... 6.55
Sparrows Point (38) B2 ... 6.55
Warren, O. R2 ... 6.55
Weirton, W.Va. W6 ... 6.90
Youngstown Y1 ... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G6	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.00
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.80
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. U5	$17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, Lt. Coated Ternes, 6lb

Yorkvill,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.00
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.70
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.30
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.60

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55
Middletown,O. A10	5.30

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.40
SparrowsPoint,Md. B2	7.26	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower) Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.40
Sp.Pt.,Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.40
Fairfield,Ala. T2	5.30
Fontana,Cal. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.30
Lackawanna,N.Y. B2	4.90
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
NewBritn.,Conn.(10) S15	10.75
Pawtucket,R.I.(11) NS	10.75
Pawtucket,R.I.(12) NS	11.06
Sharon,Pa. S3	10.60
Worcester,Mass. A7	10.30
Youngstown C8	10.60

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.70
Dover,O. G6	7.30
Ecorse,Mich. G5	6.65
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G6	3.45
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(26) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32) B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
N.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So. San Francisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.60
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Electro Galvanized

Cleveland A7	4.65
Dover,O. G6	5.60
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.06	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
Franklin,Park,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.90
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. NS: Cleve-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.66
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

STRIP, Cold-Rolled Corr

Anderson,Ind.(40) G	5.5
Berea,O. C7	6.6
Bridgeprt,Conn.(10)	5.15 5.3
Butler,Pa. A10	4.6
Cleveland A7, J5	4.6
Dearborn,Mich. D3	5.6
Detroit D2	5.6
Detroit M1	5.6
Dover,O.(40) G6	5.2
Ecorse,Mich. G6	4.2
Follansbee,W.Va. F4	5.2
Fontana,Calif. K1	5.2
FranklinPark,Ill.(40)	5.3
Ind.Harbor,Ind. I-2	4.6
Lackawanna,N.Y. B2	4.6
LosAngeles C1	6.4
Mattapan,Mass. T6	5.5
Middletown,O. A10	4.6
NewBritain(10) S15	5.2
NewCastle,Pa. B4	5.2
NewCastle(40) E5	5.2
NewHaven,Conn. D2	5.8
NewHaven,Conn. A7	5.1
Pawtucket,R.I. R3	6.0
Pawtucket,R.I.(21)	NS 5.5
Riverdale,Ill.(40) A1	4.9
Rome,N.Y. R6	5.1
Sharon,Pa. S3	5.2
SparrowsPoint,Md. B2	4.6
Trenton,N.J. R5	6.0
Wallingford,Conn. W2	5.8
Warren,O.(40) T5	5.2
Warren,O. R2	4.6
Weirton,W.Va. W6	4.6
WestLeechburg,Pa. A4	4.6
Youngstown C8, (40)	5.2
Youngstown Y1	4.6

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.5
Fontana,Calif. K1	6.7
Gary,Ind. U5	5.5
Houston,Tex. S5	5.9
KansasCity,Mo. S5	6.1
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S8	5.8
Youngstown U5	5.5

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 AmericanSteel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-WarnerCorp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cold.Roll.Mills Co.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Koppers Co. Inc.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	3.75
Warren, O. R2	4.10

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	5.25

TIGHT COOPERAGE HOOP

Ashland, Ky. A11	4.05
Riverdale, Ill. A1	3.90
Sharon, Pa. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Alabama City R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.85	6.40
Bartonville(19) K4	5.95	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston, Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet, Ill. A7	5.70	6.15
Kansas Cy, Mo. S6	6.30	6.75
Kokomo C16	5.80	6.05
Los Angeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts. Calif. C11	6.65	6.80
Prtsmth. (18) P12	6.10	6.60
Rankin A7	5.70	6.15
So. Chicago R2	5.70	5.95
So. S. Fran. C10	6.65	7.10
Sparrows Pt. B2	5.80	6.25
Sterling, Ill. (1) N15	5.70	6.15
Struthers, O. Y1	5.70	6.15
Turrance, Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	11.85
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria, O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer, Mass. W12	10.25	12.15
Pitts., Cal. C11	10.25	12.15
Prtsmth. (18) P12	10.55	12.30
Sparrows Pt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville, Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Cleveland A7	8.55	8.80
Donora, Pa. A7	8.55	8.80
Fostoria, O. S1	8.85	9.10
Johnstown, Pa. B2	8.55	8.80
Monessen, Pa. P16	8.55	8.80
Monessen, Pa. P7	8.80	9.05
NewHaven A7	8.85	9.10
Palmer, Mass. W12	8.85	9.10
Portsmouth, O. P12	8.55	8.80
Roebling, N.J. R5	8.85	9.10
Sparrows Pt. B2	8.65	8.90
Struthers, O. Y1	8.55	8.80
Trenton, N.J. A7	8.85	9.10
Waukegan, Ill. A7	8.85	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

Alabama City, Ala. R2	4.85
Aliquippa, Pa. J5	4.85
Atlanta A11	5.10
Alton, Ill. (1) L1	4.85
Bartonville, Ill. (1) K4	4.85
Buffalo W12	4.85
Chicago W13	4.85
Cleveland A7, C20	4.85
Crawfordsville, Ind. M8	5.10
Donora, Pa. A7	4.85
Duluth A7	4.85
Fairfield, Ala. T2	4.85
Fostoria, O. (24) S1	5.35
Houston S5	5.20
Johnstown, Pa. B2	4.85
Joliet, Ill. A7	4.85
Kansas City, Mo. S5	5.45
Kokomo, Ind. C16	4.95
Los Angeles B3	5.80
Minnequa, Colo. C10	5.10
Monessen, Pa. P7	5.10
Newark, 6-8ga. I-1	5.50
No. Tonawanda B11	4.85
Palmer, Mass. W12	5.15
Pittsburg, Calif. C11	5.80
Portsmouth, O. P12	5.25
Rankin, Pa. A7	4.85
So. Chicago, Ill. R2	4.85
So. San Francisco C10	5.80
Sparrows Point, Md. B2	4.95
Sterling, Ill. (1) N15	4.85
Struthers, O. Y1	4.85
Torrance, Calif. C11	5.80
Waukegan, Ill. A7	4.85
Worcester, Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson, Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville, Ind. M8	6.20
Detroit D2	6.20
Dover, O. G6	6.20
Fostoria, O. S1	6.00
Kokomo, Ind. C16	5.70
Franklin Park, Ill. T6	6.20
Massillon, O. R8	5.85
Monessen, Pa. P16	5.85
Monessen, Pa. P7	6.10
NewHaven, Conn. D2	6.50
Pawtucket, R.I. (12) N8	6.85
Trenton, N.J. R5	6.15
Worcester A7	6.00
Worcester T6	6.50
Worcester W12	6.65

WIRE, Fine & Weaving (8" Coils)

Bartonville, Ill. (1) K4	8.80
Buffalo W12	8.80
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville, Ind. M8	8.95
Fostoria, O. S1	8.80
Johnstown, Pa. B2	8.90
Kokomo, Ind. C16	8.90
Monessen, Pa. P16	8.90
Palmer, Mass. W12	9.20
Portsmouth, O. P12	8.90
Roebling, N.J. R5	8.20
Waukegan, Ill. A7	8.90
Worcester, Mass. A7, T6	9.20

WIRE, Galv'd ACSR for Cores

Bartonville, Ill. K4	8.50
Monessen, Pa. P16	8.50
Roebling, N.J. R5	8.80
Sparrows Point, Md. B2	8.25

WIRE, Tire Bead

Bartonville, Ill. (1) K4	10.90
Monessen, Pa. P16	11.40
Roebling, N.J. R5	11.55

WIRE, MB Spring, High Carbon

Aliquippa, Pa. J5	6.25
Alton, Ill. (1) L1	6.25
Bartonville, Ill. (1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora, Pa. A7	6.25
Duluth A7	6.25
Fostoria, O. S1	6.25
Johnstown, Pa. B2	6.25
Los Angeles B3	7.20
Milbury, Mass. (12) N6	8.05
Monessen, Pa. P7, P16	6.25
Palmer, Mass. W12	6.55
Pittsburg, Calif. C11	7.20
Roebling, N.J. R5	6.35
Portsmouth, O. P12	6.25
So. Chicago, Ill. R2	6.25
So. San Francisco C10	6.85
Sparrows Point, Md. B2	6.35
Struthers, O. Y1	6.25
Trenton, N.J. A7	6.55
Waukegan, Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester, Mass. J4	6.75

WIRE, Upholstery Spring

Aliquippa, Pa. J5	5.80
Alton, Ill. (1) L1	5.90
Buffalo W12	5.80
Cleveland A7	5.90
Donora, Pa. A7	5.80
Duluth A7	5.90
Johnstown, Pa. B2	5.80
Los Angeles B3	6.85
Monessen, Pa. P7, P16	5.90
NewHaven, Conn. A7	6.20
Palmer, Mass. W12	6.20
Pittsburg, Calif. C11	6.85
Portsmouth, O. P12	5.90
Roebling, N.J. R5	6.20
So. Chicago, Ill. R2	5.80
Sparrows Point, Md. B2	6.00
Torrance, Calif. C11	6.85
Trenton, N.J. A7	6.20
Waukegan, Ill. A7	5.90
Worcester, Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga. Col

Alabama City, Ala. R2	126
Ala. City, Ala., 17-Ega. R2	213
Aliquippa, Pa. 9-14½ ga. J5	130
Atlanta A11	133
Bartonville, Ill. (19) K4	130
Crawfordsville, Ind. M8	132
Donora, Pa. A7	130
Duluth A7	130
Houston, Tex. S5	138
Fairfield, Ala. T2	130
Johnstown, Pa. B2	130
Johnstown, 17ga., 6" B2	204
Johnstown, 17ga., 4" B2	207
Joliet, Ill. A7	130
Kansas City, Mo. S5	142
Kokomo, Ind. C16	132
Minnequa, Colo. C10	138
Monessen, Pa. P7	135
Pittsburg, Calif. C11	153
Portsmouth, O. (18) P12	137
Rankin, Pa. A7	130
So. Chicago, Ill. R2	126
Sterling, Ill. (1) N15	130

FENCE POSTS Col.

Chicago Hts., Ill. C2	140
Duluth A7	125
Franklin, Pa. F5	140
Huntington, W.Va. W7	140
Johnstown, Pa. B2	140
Marion, O. P11	140
Minnequa, Colo. C10	130
Moline, Ill. R2	136
So. Chicago R2	140
Tonawanda, B12	140
Williamsport, Pa. S19	150

WIRE, Barbed Col.

Alabama City, Ala. R2	136
Aliquippa, Pa. J5	140
Atlanta A11	143
Bartonville, Ill. (19) K4	143
Crawfordsville M8	145
Donora, Pa. A7	140
Duluth, Minn. A7	140
Fairfield, Ala. T2	140
Houston, Tex. S5	144
Johnstown, Pa. B2	140
Joliet, Ill. A7	140
Kansas City, Mo. S5	152
Kokomo, Ind. C16	142
Minnequa, Colo. C10	146
Monessen, Pa. P7	145
Pittsburg, Calif. C11	160
Portsmouth, O. (18) P12	147
Rankin, Pa. A7	140
So. Chicago, Ill. R2	136
So. San Fran., Calif. C10	160
Sparrows Point, Md. B2	142
Sterling, Ill. (1) N15	140

BALE TIES, Single Loop Col.

Alabama City, Ala. R2	123
Atlanta A11	126
Bartonville, Ill. (19) K4	123
Chicago W13	123
Crawfordsville MS	132
Donora, Pa. A7	123
Duluth A7	123
Fairfield, Ala. T2	123
Joliet, Ill. A7	123
Kansas City, Mo. S5	135
Kokomo, Ind. C16	125
Minnequa, Colo. C10	128
Pittsburg, Calif. C11	147
So. Chicago, Ill. R2	123
So. San Fran., Calif. C10	147
Sparrows Point, Md. B2	125
Sterling, Ill. (1) N15	123

NAILS & STAPLES, Non-Stock

Alabama City, Ala. R2	6.10
Bartonville, Ill. (19) K4	5.95
Crawfordsville, Ind. M8	6.30
Donora, Pa. A7	5.95
Duluth A7	5.95
Johnstown, Pa. B2	5.95
Joliet, Ill. A7	5.95
Kokomo, Ind. C16	6.05
Minnequa, Colo. C10	6.20
Pittsburg, Calif. C11	6.50
Portsmouth, O. P12	6.25
Rankin, Pa. A7	5.95
So. Chicago, Ill. R2	6.10
Sparrows Point, Md. B2	6.05
Sterling, Ill. (1) N15	5.65
Worcester, Mass. A7	6.25

NAILS, Cut (100 lb keg)
To dealers (33)

Conshohocken, Pa. A3	$7.35
Wheeling, W.Va. W10	7.15

NAILS & STAPLES, Stock to dealers & mfrs. (7) Col.

Alabama City, Ala. R2	118
Aliquippa, Pa. (13) J5	118
Atlanta A11	121
Bartonville, Ill. (19) K4	118
Chicago, Ill. W13	130
Cleveland A9	126
Crawfordsville, Ind. M8	122
Donora, Pa. A7	118
Duluth A7	118
Fairfield, Ala. T2	118
Galveston, Tex. D7	126
Houston, Tex. S5	126
Johnstown, Pa. B2	118
Joliet, Ill. A7	118
Kansas City, Mo. S5	130
Kokomo, Ind. C16	120
Minnequa, Colo. C10	123
Monessen, Pa. P7	124
Pittsburg, Calif. C11	137
Portsmouth, O. P12	124
Rankin, Pa. A7	118
So. Chicago, Ill. R2	118
Sparrows Point, Md. B2	120
Sterling, Ill. (1) N15	118
Torrance, Calif. C11	138
Worcester, Mass. A7	124

STANDARD TRACK SPIKES

Ind. Harbor, Ind. I-2, Y1	6.15
Kansas City, Mo. S5	6.40
Lebanon, Pa. B2	6.15
Minnequa, Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So. Chicago, Ill. R2	6.15
Struthers, O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

Kansas City, Mo. S5	9.85
Lebanon, Pa. (32) B2	9.85
Minnequa, Colo. C10	9.85
Pittsburgh O3, P14	9.80
Seattle B3	10.40

TIE PLATES

Fairfield, Ala. T2	4.50
Gary, Ind. U5	4.50
Ind. Harbor, Ind. I-2	4.50
Lackawanna, N.Y. B2	4.50
Minnequa, Colo. C10	4.50
Pittsburg, Calif. C11	4.65
Seattle B3	4.65
Steelton, Pa. B2	4.50
Torrance, Calif. C11	4.65

JOINT BARS

Bessemer, Pa. U5	4.70
Fairfield, Ala. T2	4.70
Ind. Harbor, Ind. I-2	4.70
Joliet, Ill. U5	4.70
Lackawanna, N.Y. B2	4.70
Minnequa, Colo. C10	4.70
Steelton, Pa. B2	4.70

AXLES

Ind. Harbor, Ind. S18	5.60
Johnstown, Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer, Pa. U5	3.60	3.50	3.55	4.00
Ensley, Ala. T2	3.60	3.50	...	4.00
Fairfield, Ala. T2	...	...	...	4.00
Gary, Ind. U5	3.60	3.50	3.55	...
Huntington, W.Va. W7	...	...	...	5.00
Ind. Harbor, Ind. I-2	3.60	3.50	3.55	...
Johnstown, Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa, Colo. C10	3.60	3.50	...	4.50
Steelton, Pa. B2	3.60	3.50	...	...
Williamsport, Pa. S19	...	...	...	4.75

TOOL STEELS

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	185.50
Cr Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, U4, V2, V3.

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng. HighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island SteelCorp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv., EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Corp.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West. Auto. Mach. Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.

Y1 Youngston Sheet & Tube

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, to fabricators (elec. furn. billet, 5.40c); to consumers, 6.15c.
(27) Bar mill sizes.
(28) Reinforced.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter; 60" & narrower.
(38) 16 gage & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.56	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	6.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	43.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ¼", 1½ points lower on ⅜", and 2 points lower on ½", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜"; following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4". Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ½", plus 2½% on ¾", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ⅜", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1¼ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.9c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1⅝	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2½	12	26.92	32.97	26.98	31.76
2⅝	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base Both Sides 10%	Strip Cold-Rolled Carbon Base Both Sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Cu Base Both Sides
302	....	....	....	....	19.75	27.50	77.00
304	25.00	28.00–29.50	....	....	20.75–24.50	27.50	77.00
309	30.50	35.00	....	....	....	....	....
310	36.50	41.00	....	....	....	....	144.00
316	29.50	31.50–34.00	....	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....	....
318	33.50	38.00	....	....	....	....	....
321	26.50	31.00	....	....	23.00	33.00	111.00
347	27.50	30.50–32.00	....	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....	....‡
410	20.75	27.25	....	....	....	....	....
Nickel	33.25	44.25	41.00	64.00	....	....	....
Inconel	41.00	53.50	....	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J5; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ⅞-in. 18.5
- 1-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

H.P. & C.P.	Reg.	Heavy
Square:		
½-in. & smaller	15	15
⅝-in. & ⅞-in.	12	6.5
1-in.-1⅛-in.	9	1
1⅛ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	16.5	6.5
1-in.-1½-in.	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	23	17.5
1-in. & 1⅛-in.	19.5	12
1⅛-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Reg.	Hvy.
½-in. & smaller	35	28.5
⅝-in. & ⅞-in.	29.5	22
1-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
		Light
⅞-in. & smaller		35
1-in. to 1½-in.		28.5
1¾-in. to 1½-in.		26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 48 & 10
Plated finishes .... 31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger 16
N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
⅜-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers . . List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam.	Length	Cents per lb
17,18,20	60,72	17.00
8 to 16	48,60,72	17.00
7	48,60	18.64
6	48,60	19.95
4.5⅛	40	20.48
3	40	21.53
2½	24,30	22.05
2	24,30	24.15

CARBON

40	100,110	7.65
35	100,110	7.65
30	84,110	7.65
24	72 to 104	7.65
17 to 20	34,90	7.65
14	60,72	8.14
10,12	60	8.42

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	41.00	34.00	31.25
302	41.00	36.50	31.25
303	43.00	40.00	33.75
304	43.00	38.50	32.75
309	55.50	54.50	44.25
316	56.50	58.50	48.75
321	49.00	48.00	36.75
347	63.50	52.00	41.25
410	36.50	30.50	25.75
416	37.00	37.00	28.25
420	44.00	47.00	31.25
430	39.00	31.00	26.25
501	27.50	26.00	14.25
502	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.

Dunkirk, N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502, S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg..26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia..$32-$45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

	Cents
Sponge iron 98 + % Fe, carlots Swedish, c.f.f. New York, in bags	16.00
Electrolytic Iron: Annealed, 99.5% Fe	42.50
Unannealed, 98 + % Fe	36.50
Unannealed, 99 + % Fe(minus 325 mesh)	58.50
Powder Flakes	48.50
Carbonyl Iron: 97.9-99.8%, size 5 to 10 microns	83.00-148.00
Aluminum: Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	33.50
Brass, 10-ton lots	30.00-33.25
Copper: Electrolytic	37.50
Reduced	33.75-37.00
Lead	25.50
Manganese: Minus 100-mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed	83.00
Nickel-Silver, 10-ton lots	44.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainless Steel, 302	$1.25
Tin	$1.69
Zinc, 10-ton lots	23.00-30.50

Tungsten:	Dollars
99%, minus 80 to 200 mesh, freight allowed: over 1000 lb.	2.90
1000 lb	2.95
Less than 1000 lb	3.00
98.8% minus 65 mesh, freight allowed: 1000 lb. and over	4.15
less than 1000 lb.	4.25
Molybdenum: 99%, minus 80 to 200 mesh, over 500 lb	2.85
200 to 500 lb	3.10
less than 200 lb	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvil.fur. .$14.50-15.00
Connellsvil.fdry. ..17.00-18.00
New River, foundry ...19.50
Wise county, foundry..15.00
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens..$22.75
Everett, Mass., ovens
- New England, del...24.80
- Chicago, ovens 21.00
- Chicago, del. 22.45
- Detroit, del. 24.91

Terre Haute, ovens.. 22.50
Milwaukee, ovens 23.75
Indianapolis, ovens .. 22.75
- Chicago, del. 26.62
- Cincinnati, del. 24.67
- Detroit, del. 26.65

Ironton, O., ovens ...21.50
- Cincinnati, del. 24.06

Painesville, O., ovens..24.00
- Buffao, del. 26.12
- Cleveland, del. 25.72

Erie, Pa., ovens 23.50
Birmingham, ovens ...20.30
- Birmingham, del. 21.69

Philadelphia, ovens ... 22.70
Nevillelsland,Pa.,ovens 23.00
Swedeland, Pa., ovens 22.00
St. Louis, ovens 24.25
- St. Louis, del. 25.38

Portsmouth, O., ovens 21.50
- Cincinnati, del. 24.06

Detroit, ovens 24.00
- Detroit, del. *25.00
- Buffalo, del. 27.04
- Flint, del. 26.44
- Pontiac, del. 25.39
- Saginaw, del. 26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-truck charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§	Shapes	Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	5.58	8.04
New York(c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city) ..	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try) .	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city) ..	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try) ..	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city) ...	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try) ...	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va. ..	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va. .	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse) .	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.) ..	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse).	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.06	7.35
Pitts. (w'hse) ..	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse) .	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse) .	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city) ..	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city) .	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try).	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.).	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††§	5.78	5.93	7.13
St. L. (w'hse) .	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††§	5.58	5.73	6.93
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity(w'hse) .	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr. ..	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm (city) .	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse) ..	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco..	6.65	7.80*	8.90[3]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma .	7.05	8.60[4]	9.20[3]	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa. $99.60 Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill., $94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O. $66.

Wire Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah. Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

BASIC BRICK

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

MAGNESITE

Per net ton, Chewelah, Wash. Domestic deadburned, ⅜" grains; bulk, $36.30; single paper bags, $41.80.

DOLOMITE

Per net ton. Domestic, burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Narlo, Clay Center, Woodville, Gibsonburg, Bettsville, O., Billmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950 in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports; duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

	Indian and African	
48%	2.8:1	$32.50
48%	3:1	35.00-36.00
48%	no ratio	26.00
	South African Transvaal	
44%	no ratio	$24.00-25.00
45%	no ratio	20.00
48%	no ratio	$31.00-32.00
50%	no ratio	28.00-28.50
	Brazilian	
44%	2.5:1 lump	$32.00
	Rhodesian	
45%	no ratio	$20.00-21.00
48%	no ratio	26.00
48%	3:1 lump	35.00-36.00
	Domestic—rail nearest seller	
48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227, less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lot 38.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 18-17%, deduct 0.2 from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, cl., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" Ferrochrome: (Cr 60-65% Si 4-6%, Mn

(Please turn to page 178)

Oxygen cuts electric furnace melting costs over $2,000 per month

WEHR STEEL COMPANY, of Milwaukee, Wisconsin, wanted to compare the refining of acid electric steel using oxygen with that of their usual method—the use of iron ore. They hoped to reduce refining costs without affecting the quality of the finished steel.

Clarence Nolan and W. R. Lysobey, Airco Technical Sales Representatives, were called in and suggested a series of test heats using Airco oxygen. On the basis of these tests, it was found that the cost of Airco 99.5% pure oxygen is about the same as the iron ore it replaced . . . *but,* the savings in ferro manganese, heat time, electrodes and power were appreciable—amounting to more than $1.00 per ton melted on a monthly tonnage of about 2,000 tons. Furthermore, the high quality of the steel was maintained.

Additional savings were also enjoyed when the problem of handling and storing iron ore was eliminated.

The Wehr Steel Company was most pleased with these results and have adopted oxygen refining of acid electric steel as standard practice.

For technical assistance on this unique refining process or a copy of our folder "Oxygen In The Electric Furnace," please write to your nearest Airco office.

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

More news about AIRCO steel mill processes

ACETYLENE SMOKING ELIMINATES HYDROGEN TRACES ON STEEL SURFACE

A leading steel mill, after experimenting on more than 2,000 molds of various sizes, plans to use acetylene ingot mold smoking in all molds that will be used for the pouring of "Tool Steels", "Electric Furnace Steel", "Acid Open Hearth Steel", and "Roll Foundry Steel". They claim that steel poured in molds—*and treated in any other way than by acetylene smoking,* show traces of hydrogen in the surface of the steel.

THE ECONOMICAL WAY TO CUT HEAVY SCRAP TO CHARGING BOX SIZE

Today, Airco offers steel men outstanding oxyacetylene cutting methods for easy and economical handling of heavy scrap. Practically any heavy scrapping job can be handled . . . regardless of size, shape or location . . . with:

- **the oxyacetylene torch, plus oxygen lance.** Buttons, ingots, and similar large chunks can be cut to size in any position without initial handling.
- **machine gas cutting.** Where crane facilities are available, this set-up is ideal. All it requires is a heavy-duty cutting torch mounted on a standard Airco No. 10 Radiagraph or a Travograph.
- **the oxygen lance.** Where extremely large sections, such as open hearth spills and huge ingots are to be cut, the oxygen lance should be used.

All this is just another example of how modern Airco oxyacetylene equipment is helping steel mills slash time and costs.

★ ★ ★

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Calcium Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting, and arc welding . . . we'll be glad to help you.

U.S. Seeks Larger Metal Supplies

Intensifies efforts to obtain larger tonnages from abroad and aids producers in boosting domestic operations. Loan program for mine development expected by spring

New York—Government agencies are attacking the stringency in nonferrous metals on a wide front. Negotiations with metal producers in Canada, Mexico, South America and Africa are being intensified to increase shipments to this country. In some instances production is being stimulated by means of Marshall Plan aid; in others, by direct purchase agreements.

Domestic producers are receiving government aid in building new facilities and in reactivating idle plants. A loan program for metal mine development seems assured by spring. Goals involve expansion of existing facilities, reopening of inactive properties and new exploration.

Supplies of metals to be made available as a result of these programs will not reach large tonnages for several months. In the meantime, the government is conserving supplies by tightening restrictions on their use in civilian goods. NPA issued five orders Jan. 27 which limit the use of tin and tin products.

Tin Stocks Drop—Based on the latest *Bulletin* issued by the International Tin Study Group, world mine production of tin increased to 13,600 long tons in October from 13,200 tons in September, lifting the annual rate to 163,100 tons compared with 161,800 in 1949. World stocks at end of August declined to 117,300 tons from 117,900 tons at end of July. World tin consumption rose to 14,100 tons in August from 12,600 in July.

NPA is considering some relaxation of its present ban on use of copper in home construction. At the same time, the agency is considering definite curbs on the amount of metals, including copper, that may be used to make automobiles, refrigerators, washing machines, stoves, furnaces, etc.

Copper Use Declines—Consumption of copper by fabricators dropped sharply in December to 115,390 tons from 128,790 in November. This brought 1950 consumption to 1,440,895 tons compared with 1,053,225 in 1949. Fabricators received only 1,373,194 tons from producers of copper, or 67,701 tons less than the amount used.

Reflecting the drop in consumption in December, fabricators' stocks at yearend increased to 289,313 tons, an increase of 11,723 from the previous month. Unfilled orders on fabricators' books at yearend totaled 312,124 tons compared with 313,450 tons at end of November, making the deficit in stocks available for sale 218,831 tons.

Stocks of lead at refineries dropped to 35,619 tons at end of December from 40,910 tons at end of November and 70,424 at end of 1949. Shipments of refined lead to domestic consumers increased about 40 per cent last year to 499,637 tons from 355,905 in 1949. The movement in December eased to 49,601 tons from 58,658 in November. Production during 1950 totaled 571,763 tons compared with 542,676 in 1949.

Fosters African Metal Mining

Washington — Copper, lead and zinc for United States stockpiling may be obtained in French Equatorial Africa under an exploration program financed with Marshall aid.

The Economic Co-operation Administration advanced $1,855,000 and the equivalent of $2,385,000 in French counterpart francs to the Mid-African Exploration Co., a subsidiary of Newmont Mining Co., New York, and to its associated French companies, Explorations Minieres au Congo and Societe Miniere du Niari. The Marshall Plan funds will be repaid in shipments of metals to the United States stockpile in the event that exploitable deposits are discovered and developed.

The areas to be explored are located in the Niari Basin. Copper mining was started on a modest scale in 1911 in the Mindouli area. More recently, lead and zinc deposits were found.

STEEL'S Metal Price Averages for Jan., 1951

(Cents per pound)

Electrolytic Copper, del. Conn.	24.500
Lead, St. Louis	16.800
Prime, Western Zinc, E. St. Louis	17.500
Straits Tin, New York	171.798
Primary Aluminum ingots, del.	19.000
Antimony, f.o.b. Laredo, Tex.	35.462
Nickel, f.o.b. refinery	50.500
Silver, New York	88.890

Futures Trading Suspended

New York—Pending clarification of the government's price-freeze order, board of governors of the Commodity Exchange suspended trading in copper, lead, zinc and tin futures until further notice. Nearly all exchange dealings in commodities, except for grains, came to a halt.

Crisis in Copper Approaches

New York—Crisis in copper supply is closing in rapidly on the nation and the world. An all-time high rate of copper production, with no appreciable increase in supplies of raw copper ore, is depleting available reserves.

Although the nonferrous alloy industry is doing everything in its power to ferret out additional sources of copper, it is far from getting supplies sufficient to meet staggering demands. The United States utilized more than 1.2 million net tons of domestic copper in 1950 to top all previous production records. During December alone, stocks were reduced more than 2700 tons, leaving in the industry (not including government stockpiles) only about 49,000 tons, or some 66,000 tons of the amount held at the end of 1949.

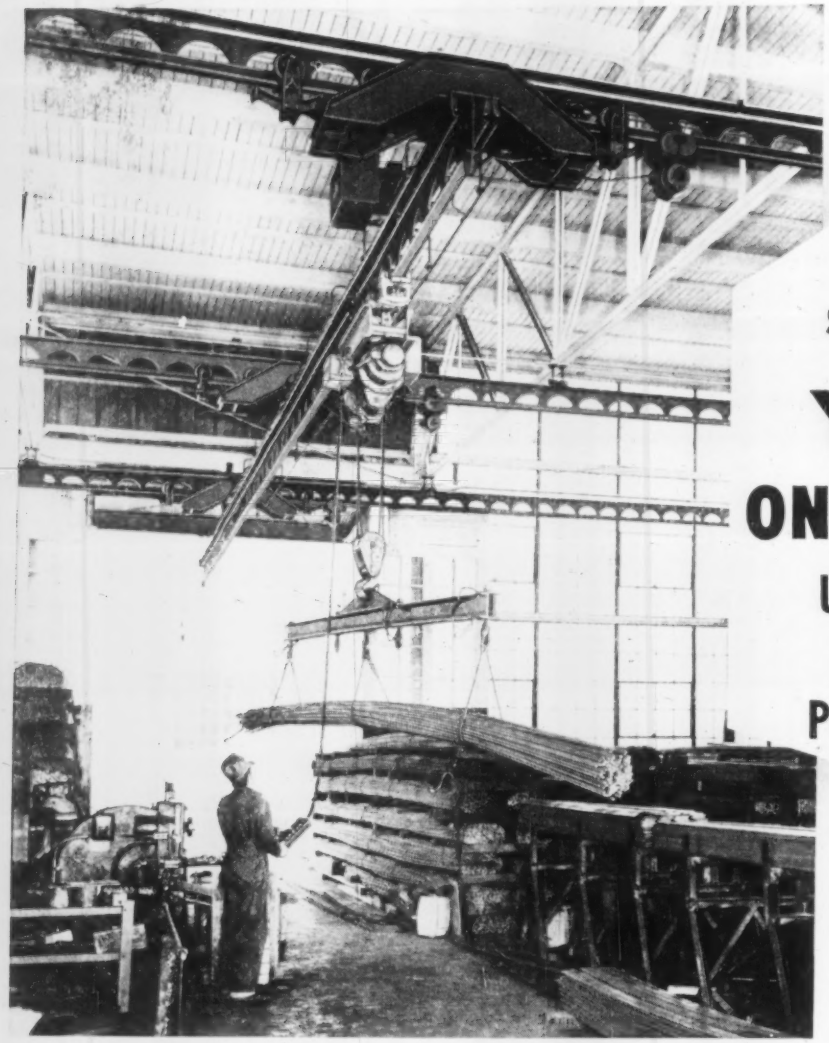
"At this rate, the crisis seems imminent;" says James T. Duffy Jr., president, Riverside Metal Co., Riverside, N. J. . . . "Either copper sources must be increased, or, by more drastic legal limitation of nonessential uses, the demand lessened. If further prohibitions such as NPA orders are imposed, a marked cutback in production would be the only possible result. The repercussions of such a move would reflect in an already critical labor market."

Imports and Stockpiles — At this point, our only real hope, he believes, is to make available greater quantities of raw copper. Immediate supplies are available from two main sources: South America (with repeal of the 2 cents per pound tariff) and government stockpiles. In addition, it is widely known that many scrap dealers are withholding large quantities of their commodity from the market in anticipation of even higher prices.

WANTS COPPER RELEASED: Urging that the government curb on use of copper be amended to permit use of copper materials now in inventory is William J. Levitt (above) of New York. One of the nation's largest home builders, he believes that the restriction on copper, used in water pipes, will halt all home building by April 30

Aluminum Output Gains Steadily

Washington — Domestic production of primary aluminum increased 3466 tons in October to 62,915 tons, reports the Bureau of Mines. Output for the first 10 months was 112 per cent of the total for the like period in 1949 and 140 per cent of the monthly average for the five years ended in December, 1949. Consumption in October amounted to 58,876 tons, resulting in an increase of 4039 tons in stocks to 13,731 tons.



SAVES $5,000 YEARLY ON STEEL COST

Unloading Time Cut 2 Hours Per Railroad Car

5-ton, 3-runway, 50-ft. span, completely motorized Cleveland Tramrail bridge operated by pushbuttons from floor. Bridge is shown interlocked with track extending out doorway over railroad. This Tramrail system has been in service since 1943.

A handsome dividend is being earned by the Kortick Manufacturing Co., San Francisco, Calif., on its Tramrail transfer bridge installation.

Because the bridge is of 5 tons capacity, the rods, bars and angle iron which Kortick uses for the manufacture of pole line hardware, can be bought and handled in 5-ton bundles. This eliminates a bundling charge made for smaller bundles. The savings is $2.00 per ton. As Kortick takes in an average of 200 tons per month, the monthly saving amounts to $400.

The bridge interlocks with an outside Tramrail track that extends over a railroad track. This enables the hoist carrier to deliver steel directly from railroad cars to any point inside the building served by the bridge. Because of this feature and the fact that heavier bundles are handled, a saving of about 2 hours unloading time is made per 50-ton car of steel, over their former method which employed a 3-ton hoist.

Obviously with total savings running in the neighborhood of $5,000 yearly, it did not take long for this Tramrail installation to pay for itself.

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CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7861 EAST 284th ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c. Conn. Valley; Lake 24.61½c. delivered.

Brass ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 43.25c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.00c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.60c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.00-30.50c; No. 12 foundry alloy (No. 2 grade) 29.50-30.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.00c; grade 2, 30.00-30.25c; grade 3, 29.00-29.50c; grade 4, 28.50-29.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt, 182.50c; Feb, 182.00c; Mar, 179.00c.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%, nominal.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $225 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 39.93-41.68; yellow brass 36.86-38.28; commercial bronze, 95%, 39.91-41.61; 90%, 39.48-41.13; red brass, 85%, 38.54-40.14; 80%, 38.12-39.67; best quality, 39.15; nickel silver, 18%, 50.57-51.91; phosphor-bronze grade A, 5%, 58.49-60.20.

Rod: Copper, hot-rolled 35.78-37.53; cold-drawn 37.03-38.78; yellow brass free cutting, 31.26-32.63; commercial bronze, 95%, 39.60-41.30; 90%, 39.17-40.82; red brass 85%, 38.23-39.83; 80%, 37.81-39.36.

Seamless Tubing: Copper 39.97-41.72; yellow brass 39.87-41.29; commercial bronze, 90%, 42.14-43.79; red brass, 85%, 41.45-43.05; 80%, 42.58.

Wire: Yellow brass 37.15-38.57; commercial bronze, 95%, 40.20; 90%, 39.77-41.42; red brass, 85%, 38.83-40.43; 80%, 38.41-39.96; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-29.42, l.c.l. 29.17-29.92. 100,000 lb lots 28.545-29.295; weatherproof, f.o.b. eastern mills, c.l. 29.60, l.c.l. 30.10, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4,	R317-T4	——Hexagonal——	17S-T4
0.125	52.0	....	....	
0.156-0.188	44.0	....	....	
0.219-0.313	41.5	....	....	
0.375	40.0	46.0	48.0	
0.406	40.0	....	....	
0.438	40.0	46.0	48.0	
0.469	40.0	....	....	
0.500	40.0	46.0	48.0	
0.531	40.0	....	....	
0.563	40.0	....	45.0	
0.594	40.0	....	....	
0.625	40.0	43.5	45.0	
0.688	40.0	....	45.0	
0.750-1.000	39.0	41.0	42.5	
1.063	39.0	....	41.0	
1.125-1.500	37.5	39.5	41.0	
1.563	37.0	....	....	
1.625	36.5	....	39.5	
1.688-2.000	36.5	....	....	

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq. ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill pate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 37.69c; oval 37.19c; cast 37.375c.

Copper Cyanide: 70-71% Cu 100-lb drums, 1000 lb 60.5c, under 1000 lb 62.5c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c; 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound delivered eastern refineries, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; composition red brass 22.00-22.50; radiators 17.50-17.75; heavy yellow brass 17.75.

* Nominal.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 19.50.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 20.00; No. 2 18.50; light copper 17.25; No. 1 composition red brass 17.00-17.50; No. 1 composition turnings 16.50-17.00; mixed brass turnings 12.00-12.50; new brass clippings 17.50-18.00; No. 1 brass rod turnings 16.00-16.50; light brass 11.00; clean heavy yellow brass 14.50-15.00; new brass rod ends 16.50-17.00; auto radiators 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe 17.00-17.50.

Lead: Heavy 14.50-14.75; battery plates 8.75-9.00; linotype and stereotype 14.50-14.75; electrotype 12.75-13.00; mixed babbitt 12.25-12.50.

Zinc: Old zinc 11.00-11.25; new die cast scrap 10.75-11.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 63.00-65.00; block tin pipe 90.00; No. 1 babbitt 58.00-60.00.

Aluminum: Clippings 2S 19.00-19.50; old sheets 15.50-16.00; crankcase 15.50-16.00; borings and turnings 12.00-12.50.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Feb. 1	24.50	16.80	17.50	182.50	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	42.00	50.50	90.16
Jan. 29-31	24.50	16.80	17.50	183.00	19.00	42.00	50.50	90.16
Jan. 26-27	24.50	16.80	17.50	182.00	19.00	42.00	50.50	90.16
Jan. 25	24.50	16.80	17.50	183.00	19.00	42.00	50.50	90.16
Jan. 24	24.50	16.80	17.50	180.00	19.00	42.00	50.50	90.16
Jan. 23	24.50	16.80	17.50	178.00	19.00	42.00	50.50	90.16
Jan. 22	24.50	16.80	17.50	176.00	19.00	42.00	50.50	90.16
Jan. 19-20	24.50	16.80	17.50	175.50	19.00	32.00	50.50	90.16
Jan. 18	24.50	16.80	17.50	175.75	19.00	32.00	50.50	90.16
Jan. 17	24.50	16.80	17.50	176.00	19.00	32.00	50.50	90.16
Jan. 16	24.50	16.80	17.50	175.00	19.00	32.00	50.50	90.16
Jan. 15	24.50	16.80	17.50	172.00	19.00	32.00	50.50	90.16

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits ,del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumers prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Feb. 1, 1951, gross tons. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Feb. 1	$47.17
Jan. 25	46.33
Jan. 1951	46.16
Feb. 1950	27.52
Feb. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$51.50*
No. 2 Heavy Melt.	*49.50*
No. 1 Busheling	*51.50*
No. 1 Bundles	*51.50*
No. 2 Bundles	*48.50*
Heavy Turnings	47.00-48.00
Machine Shop Turnings	38.50
Mixed Borings, Turnings	38.50
Short Shovel Turnings	40.50
Cast Iron Borings	39.50-40.50
Low Phos. Steel	56.00-57.00

Cast Iron Grades

No. 1 Cupola Cast	58.00-60.00
No. 1 Machinery Cast	68.00-70.00
Charging Box Cast	55.00-56.00
Heavy Breakable Cast	54.00-55.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.50
Rails, Random Lengths	64.00-65.00
Rails, 2 ft and under	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	65.50-66.50

CLEVELAND

(Delivered Consuming Plant)

No. 1 Heavy Melt. Steel	*$50.50-51.00*
No. 2 Heavy Melt. Steel	*48.50-49.00*
No. 1 Busheling	*50.50-51.00*
No. 1 Bundles	*50.50-51.00*
No. 2 Bundles	*48.00-47.00*
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	39.00-40.00
Short Shovel Turnings	39.00-40.00
Cast Iron Borings	39.50-40.00
Low Phos.	*53.00-53.50*

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Charging Box Cast	53.00-54.00
Stove Plate	55.00-56.00
Heavy Breakable Cast	55.00-56.00
Unstripped Motor Blocks	44.00-45.00
Brake Shoes	50.00-51.00
Clean Auto Cast	65.00-66.00
Burnt Cast	46.00-47.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50
R.R. Malleable	72.00-73.00
Rails, 3 ft and under	70.00-71.00
Rails, 18 in. and under	71.00-72.00
Rails, Random Lengths	64.00-65.00
Cast Steel	58.00-59.00
Railroad Specialties	60.00-61.00
Uncut Tires	60.00-61.00
Angles, Splice Bars	65.00-66.00

† Plus applicable springboards

VALLEY

No. 1 Heavy Melt. Steel	*$51.00-51.50*
No. 2 Heavy Melt. Steel	*49.00-49.50*
No. 1 Bundles	*51.00-51.50*
Facty. Prod. Bundles	*51.00-51.50*
No. 2 Bundles	*48.50-47.50*
Machine Shop Turnings	38.00-38.50
Short Shovel Turnings	40.00-40.50
Cast Iron Borings	40.00-40.50
Low Phos.	*53.50-54.00*

† Plus applicable springboards

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$47.50
No. 2 Heavy Melt. Steel*	45.00
No. 1 Busheling	45.00
No. 1 Bundles	47.50
No. 2 Bundles	44.00
Short Shovel Turnings	39.00
Machine Shop Turnings	37.00
Mixed Borings, Turnings	37.00
Low Phos. Punchings and Plate, elec. fur. grade	53.00
Low Phos. Plate, 5 ft & under	53.00
Elec. Furnace Bundles	50.00
Heavy Turnings	47.00
No. 1 Chemical Borings	45.00
Knuckles and couplers	56.00-58.00
Steel car wheels	56.00-58.00

Cast Iron Grades

No. 1 Cupola Cast	54.00-55.00
No. 1 Machinery Cast	58.00-60.00
No. 1 Yard Cast	53.00
Charging Box Cast	54.00-55.00
Heavy Breakable Cast	54.00-55.00
No. 1 Wheels	70.00*
Malleable	70.00-72.00

* Nominal

CINCINNATI

No. 1 Heavy Melt. Steel	$46.00
No. 2 Heavy Melt. Steel	44.00
No. 1 Busheling	46.00
No. 1 Bundles	46.00
No. 1 Black Bundles	46.00
Machine Shop Turnings	33.00
Short Shovel Turnings	34.00
Mixed Borings, Turnings	33.00
Cast Iron Borings	34.00

Cast Iron Grades

No. 1 Cupola Cast	70.00
Charging Box Cast	60.00
Stove Plate	55.00
Heavy Breakable Cast	56.00
Unstripped Motor Blocks	42.00
Brake Shoes	37.00
Clean Auto Cast	70.00
Drop Broken Cast	72.50
Low Phos. 18 in. and under	62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00
R.R. Malleable	64.00
Rails, Rerolling	65.00
Rails, Random Lengths	65.00
Rails, 18 in. and under	72.50

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$38.25-39.00
No. 1 Bundles	40.25-41.00
No. 2 Bundles	37.25-37.50
No. 1 Busheling	40.25-41.00
Machine Shop Turnings	32.25-33.00
Forge Flashings	40.25-41.00
Short Shovel Turnings	34.25-35.00
Cast Iron Borings	34.00-35.00
Punchings & Plate Scrap	42.75-46.00

Cast Iron Grades

No. 1 Cupola Cast	54.00-55.00
Heavy Breakable Cast	46.00-48.00
Clean Auto Cast	59.00-60.00

BUFFALO

No. 1 Heavy Melt. Steel	$51.00-52.00
No. 2 Heavy Melt. Steel	49.00-50.00
No. 1 Busheling	49.00-50.00
No. 1 Bundles	50.00-51.00
No. 2 Bundles	47.00-48.00
Machine Shop Turnings	43.00-44.00
Mixed Borings, Turnings	43.00-44.00
Cast Iron Borings	43.00-44.00
Short Shovelings	45.00-46.00
Low Phos.	52.00-53.00

Cast Iron Grades

No. 1 Cupola	54.00-55.00
No. 1 Machinery	59.00-60.00
Malleable	nominal

Railroad Scrap

Rails, 2 ft and under	60.00-61.00
Rails, random size	55.00-56.00
Railroad Specialties	55.00-56.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$42.00-44.00
No. 2 Heavy Melt. Steel	40.00
No. 1 Busheling	41.00
No. 1 Bundles	42.00-44.00
No. 2 Bundles	39.00
Mixed Borings, Turnings	34.00
Machine Shop Turnings	34.00
Short Shovel Turnings	36.00
Punchings & Plate Scrap	44.50
Low Phos. Plate, 5 ft & under	44.50
Elec. Furnace Bundles	44.50

Cast Iron Grades

No. 1 Cupola Cast	47.00-48.00
No. 1 Machinery	49.00-50.00
Charging Box Cast	44.00-45.00
Heavy Breakable	44.00-45.00
Unstripped Motor Blocks	41.00-42.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$41.50-42.00
No. 2 Heavy Melt. Steel	37.00-38.00
No. 1 Bundles	41.50-42.00
No. 1 Busheling	38.00-39.00
Machine Shop Turnings	30.00-30.50
Short Shovel Turnings	31.00-31.50
Mixed Borings, Turnings	31.00-31.50
Bar Crops and Plate	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Chemical Borings	34.50-35.00

Cast Iron Grades

No. 1 Machinery Cast	50.00-51.00
Mixed Cast	45.00-46.00
Heavy Breakable Cast	43.50-44.50
Stove Plate	42.00-43.00

CHICAGO

No. 1 Heavy Melt. Steel	$45.00
No. 2 Heavy Melt. Steel	43.00
No. 1 Bundles	45.00
No. 2 Bundles	42.00
Machine Shop Turnings	*35.50-36.50*
Mixed Borings, Turnings	*35.50-36.50*
Short Shovel Turnings	*36.50-37.50*
Cast Iron Borings	*36.50-37.50*
Low Phos.	52.00-54.00
Elec. Furnace Bundles	46.00-48.00
Heavy Turnings	41.00-42.00
Cut Structurals	*52.00-53.00*

Cast Iron Grades

No. 1 Cupola Cast	61.00-63.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	60.00-62.00
Stove Plate	49.00-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-47.00*
Malleable	73.00-75.00
Rails, Rerolling	66.00-68.00*
Rails, Random Lengths	58.00-59.00
Rails, 2 ft. and under	66.00-67.00
Rails, 18 in. and under	67.00-68.00
Railroad Specialties	56.00-57.00
Angles, Splice Bars	58.00-59.00

* Brokers' buying price.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$42.00-43.00
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	40.00-41.00
No. 2 Bundles	40.50
Machine Shop Turnings	34.00-35.00
Mixed Borings, Turnings	35.50
Short Shovel Turnings	37.50
Cast Iron Borings	33.00-34.00
Bar Crops and Plate	46.00-47.00
Cut Structurals	46.00-47.00

Cast Iron Grades

No. 1 Cupola Cast	55.00-56.00
Stove Plate	49.00-50.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50
R.R. Malleable	nominal
Rails, Rerolling	60.00-61.00
Rails, 2 ft and under	65.00-66.00
Angles and Splice Bars	59.00-60.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$46.00-47.00
No. 2 Heavy Melt. Steel	41.00-42.50
No. 1 Bundles	46.00-47.00
No. 2 Bundles	40.50-41.50
Machine Shop Turnings	33.00-34.00
Short Shovel Turnings	35.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	56.00-58.00
Charging Box Cast	47.00-48.00
Heavy Breakable Cast	56.00-57.00
Brake Shoes	56.00-58.00
Clean Auto Cast	63.00-65.00
Uncut Tires	57.00-58.00
Burnt Cast	53.00-54.00

Railroad Scrap

R.R. Malleable	63.00-65.00
Rails, Rerolling	66.00-68.00
Rails, Random Lengths	59.00-61.00
Rails, 2 ft and under	65.00-67.00
Uncut Tires	57.00-58.00
Angles, Splice Bars	66.00-68.00
Railroad Specialties	60.00-62.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	28.00
No. 1 Bundles	30.00
No. 2 Bundles	28.00
No. 3 Bundles	25.00
Machine Shop Turnings	16.00
Low Phos. Electric	45.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-42.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
Rails, Random Lengths	30.00

SEATTLE

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	*26.00-28.00*
Nos. 1 & 2 Bundles	*26.00-28.00*
Machine Shop Turnings	*22.00-24.00*
Mixed Borings, Turnings	*22.00-24.00*
Punchings & Plate Scrap	40.00-41.00
Cut Structurals	40.00-41.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Heavy Breakable Cast	38.00-40.00
Stove Plate	36.00-38.00
Unstripped Motor Blocks	33.00-35.00
Malleable	33.00-35.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00
Railroad Malleable	35.00
Rails, Random Lengths	32.00-33.00
Angles and Splice Bars	32.00-33.00

LOS ANGELES

(Delivered prices)

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	28.00
No. 1 Bundles	30.00
No. 2 Bundles	28.00
No. 3 Bundles	25.00
Machine Shop Turnings	16.00
Punchings & Plate Scrap	42.00-45.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-48.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	nominal
Rails, Rerolling	48.00

HAMILTON, ONT.

(Delivered Prices)

Heavy Melt.	$30.00
No. 1 Bundles	30.00
Mechanical Bundles	28.00
Mixed Steel Scrap	28.00
Mixed Borings, Turnings	23.00
Rails, Remelting	30.00
Rails, Rerolling	33.00
Busheling	24.50
Bushelings new factory, prep'd	23.00
Bushelings new factory, unprep'd	23.00
Short Steel Turnings	23.00

Cast Iron Grades*

No. 1 Machinery Cast	50.00

* F.o.b. shipping point.

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CLEVELAND, OHIO
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LEBANON, PENNA.
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PUEBLO, COLORADO
314 Colorado Bldg.

BUFFALO, N. Y.
Genesee Building

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2011 Book Building

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READING, PENNA.
Luria Building

ST. LOUIS, MISSOURI
2110 Railway Exchange Bldg.

SAN FRANCISCO, CALIFORNIA
Pacific Gas & Elec. Co. Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Berman

Sheets, Strip . . .

Sheet and Strip Prices, Page 159 & 160

Cleveland—Tight supply conditions are expected to intensify with defense business piling up on the mills. Some producers are reported booked into August on DO account. All of them are booked through second quarter. On regular commercial business books are filled through March. April books are expected to be opened shortly. Currently, pressure of defense demand is greatest for hot-rolled sheets and this is cutting into production of cold-rolled. Also, diversion of some continuous mill rolling time to production of light plates is restricting output of light, flat-rolled tonnage. Manufacturers of certain types of civilian goods expect they will be ordered to cut back production, probably in second quarter. This, however, will not relieve the supply shortage since freed tonnage will be immediately diverted to defense and allied channels of consumption. Substantial tonnages are being offered for sale in the gray market at prices ranging up to $350 per ton for cold-rolled sheets. Hot-rolled sheets are being offered in this market up to $280 per ton.

Boston—Among casualties due to sheet shortages are auto number plates. Several states, including Massachusetts, will fabricate no tags for 1952. Except silicon grades, little sheet tonnage has been scheduled beyond March. Armament and essential program tonnage will cut deeper into civilan uses for April. Stainless bookings from April on consist largely of rated tonnage. Non-essential ban on use is not expected to result in heavy cancellations, although there is some changing over to less critical lower nickel grades. Nickel allocations have for some time exerted conservative influence on acceptance of unrated stainless orders.

New York — Reflecting the increased tempo of military orders, some producers are booked up throughout second quarter on DO-rated business, at least on the basis of minimum quotas. Certain sellers are accepting more than their minimum quota obligations in an effort to speed up military needs by working them also into second quarter. On silicon and stainless steel DO-rated orders, at least one large producer is booked into third quarter.

Philadelphia—Military requirements for sheets are increasing rapidly. Some producers can still accept a little DO-rated business for late second quarter delivery but they are the exception. On specialties, particularly silicon and stainless steels, they all appear to be sold into third quarter on rated orders.

Pittsburgh—Cut-back in production schedules among major appliance and other consumer durable goods producers has not yet showed up in reduced demand for sheets and strip. Some interests have been obtaining premium-priced steel through conversion channels and naturally will first terminate such commitments. Expansion in production facilities for direct and indirect military programs has been another offsetting factor. Rated tonnage set-asides on sheets and strip are filled through April on mill books. In some instances hot-rolled sheets are booked into third quarter on a few mill units. Upward revisions in rated tonnage percentage set-aside will result in openings in production schedules although this is partially offset by the fact some interests booked slightly more than previously stated maximum percentages to meet urgent requirements for essential end uses.

Cincinnati—Aside from the freeze on prices, the situation with sheet mills continues unchanged. Non-rated consumers want sheets in excess of allotments. Priority tonnage, however, is getting progressively heavier, tightening up the supply.

Chicago — The higher percentage set-asides for DO orders for sheets and strip become effective with mill shipments for March. While the increases are moderate, they constitute another limitation on tonnage available to civilian users. One producer indicates May is the first open month for additional DO orders on electrical sheets, and cold-rolled sheets; June on hot-rolled strip and galvanized sheets; and July on hot-rolled sheets and tin plate.

St. Louis—Sheet producers are likely to be unanimously on a monthly order-scheduling basis soon. Granite City Steel this week will open second quarter books but will allot for April only. At least two others are considering similar action until Washington policy on defense set-asides is clearer. Granite City's rated order quota on cold-rolled sheets went from 10 to 12 per cent under the revised M-1 and officials are hedging for it to go higher. Customers are currently in good position, however, since the mill's tin plate capacity for several months was turned to cold sheets during installation of new equipment. But that sheet "dividend" will cease this week with the restarting of tin plate output. The metal sign industry, particularly, which makes half of the nation's billboards and uses 10,000 tons of sheets annually, fears a shutdown unless it can convert to war work.

Los Angeles—Kaiser Steel Corp.'s new 86-in. hot-strip mill is rolling sheets for water heater fabricators.

San Francisco — Regular trade channels face a further cutback as a result of the NPA order lifting the sheet mills' set asides for DO ratings on certain types of steel products. Flat galvanized sheet supplies of the lighter gage rapidly are getting tighter.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 159

Boston—Again taking bids direct on mat reinforcement for highway concrete pavement Connecticut inquiry, approximately 550 tons, attracted but one bid, from Truscon Steel Co., 42.57c per square yard, or $73,922.80, for 173,922.80 square yards, delivered, East Hartford-Glastonbury expressway. Only one quotation was received for tonnage offered in December, American Steel & Wire Co., supplying half the original estimate, about 365 tons. Contractors are placing concrete bar requirements with difficulty. Distributor allocations are lower but shop fabricating facilities are taxed.

Steel Bars . . .

Bar Prices, Page 159

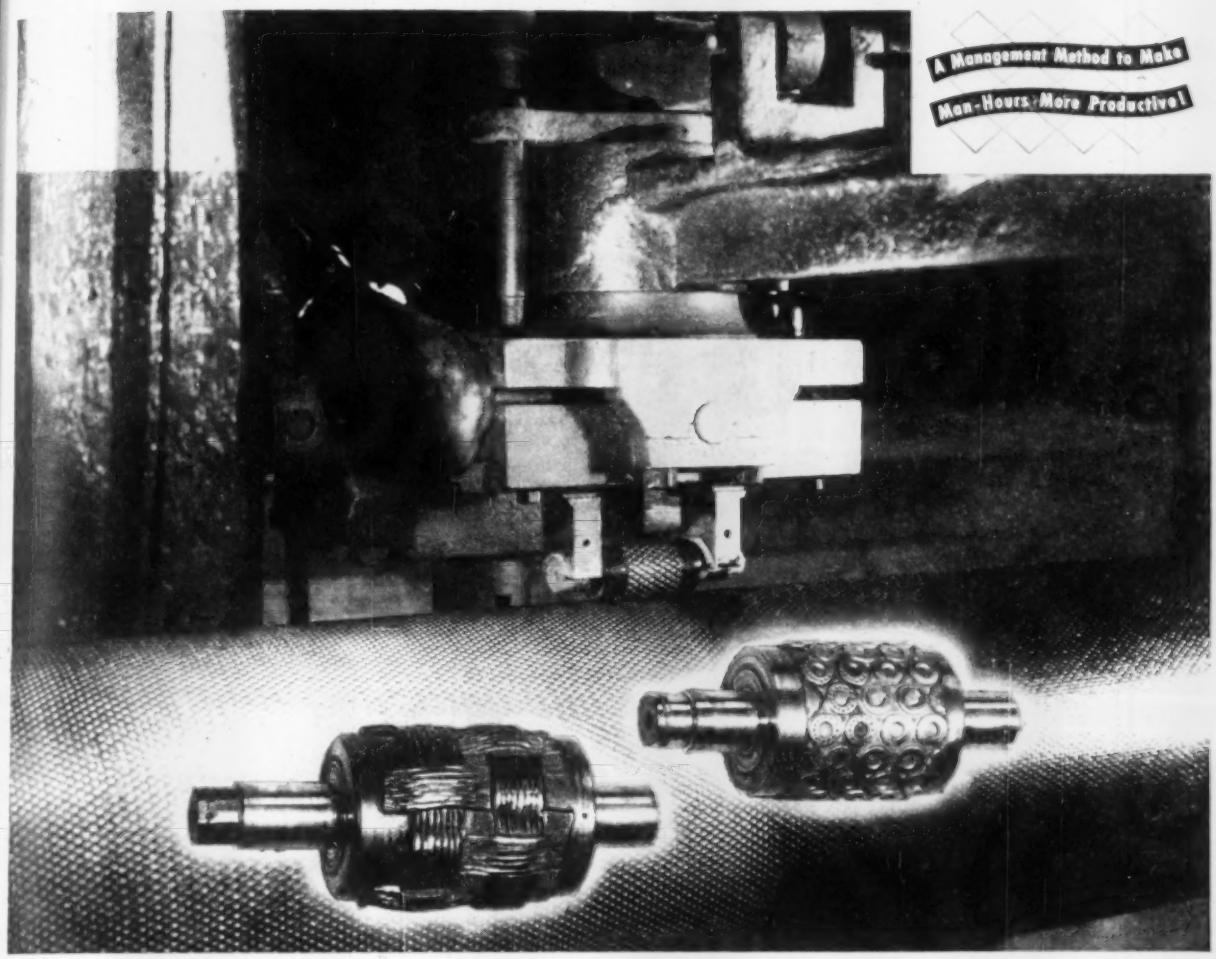
Boston—Increasing orders for hot-rolled shell quality steel are tightening large rounds and squares. No product limitation is applicable to this grade. Flats are also more extended with shortages for nuts, and to some extent high carbon for unrated production of files. Norwalk, Conn., lock firm has contracted for 13 million 20 mm. shells. Rated orders for carbon bars are increasing with volume in that category extended well into second quarter. Raising of product limitations, notably alloys, means more directly rated tonnage in March and April for some consumers, but with some letdown in unrated tonnage both months.

New York—Sellers of hot and cold carbon bars are sold into second quarter on DO-rated tonnage and are receiving allocations for April on the car and Lake ore vessel programs. On certain alloy specialties some mills are not only sold up throughout second quarter on the basis of their minimum DO quotas but into third quarter. Lead time on specialties is often well extended, which accounts in part for the advanced delivery schedules. Producers will announce schedules for April on non-rated business around mid-February. The great proportion of carbon bar tonnage will be for civilian account, although defense requirements will make heavier inroads than at any time previously. Overall demand exceeds supply.

Philadelphia—Heavy allocation of shell steel is expected shortly which will make substantial inroads into the supply of bars and billets. Meanwhile, producers of hot carbon bars are sold well into July on DO-rated business at some mills. Deliveries appear more extended on the heavier sizes of hot carbon bars than the smaller. Sellers report promises on DO-rated tonnage of cold-drawn bars and alloy bars as being more extended than on hot carbon bars.

Pittsburgh—Demand for alloy bars continues to top supply by a wide margin, and no improvement is indicated over coming months. In addition to steadily increasing requirements for military end uses through remainder of this year, sellers are faced with the probability shipments to petroleum interests and other indirect military needs will be augmented. This prompted NPA to increase hot-rolled alloy bar percentage set-aside from 25 to 35 per cent for rated tonnage. Scarcity of nickel has forced sellers to restrict distribution of high nickel bearing steels to essential end uses.

Cleveland—Bar producers are diverting increasing tonnage from civilian consuming channels. The recent increase in the DO set aside, however, did not materially alter supply conditions since sellers had been accepting defense orders above the lower set-aside maximum. The action by NPA was necessitated by the increasing number of orders carrying DO ratings. With more manufacturers getting into defense work the DO order load is mounting steadily. Pressure is particularly strong for alloy bars. Cold-finishers are having difficulty meeting commitments because



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These knurling mills, made from No. 11 Special (Water-Hard) Tool Steel, press artistic patterns into large steel rolls for embossing cloth, paper and plastic. Here's what was required of the tool steel: It had to be hard enough to prevent upsetting; tough enough to prevent delicate edges from breaking under operating pressures up to 5 tons. Patterns on the mills were quite fragile and sections as deep as $\frac{1}{16}$" could not collapse. Further, the steel had to heat treat with very little warpage.

But picking the proper steel wasn't as tough as you may imagine. For the Carpenter Matched Set Method not only indicated the one *best* steel for the job but enabled production management to "call its shots" . . . have the mills produce the required number of patterns on schedule, with less costly downtime.

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of shortage of hot-rolled carbon bars.

Chicago — Bar users are gearing their production schedules to tonnages available from mills and other sources of supply. Receipts shrink with each passing month under impact of rising DO and support program requirements. The effect will be more noticeable in March when mill maximum DO percentages for hot rolled bars are boosted from 5 per cent currently to 10 per cent. First opening which one producer has for hot-rolled for DO account is the May-June rolling cycle. Some rail tonnage can be taken for June.

Seattle — Rolling mill operations continue at capacity but order backlogs are down slightly. Inquiry for small tonnages has slowed due to government restrictions on building. Merchant bars are in active demand and warehouses are pressing the mills for replacement stocks. Reinforcing bars constitute the bulk of mill output.

Structural Shapes . . .

Structural Shape Prices, Page 159

New York — Structural bookings of 2,529,832 tons last year were the largest since 1930, according to the American Institute of Steel Construction Inc. They compared with 1,432,972 tons in 1949 and the average of 1,509,496 for 1936-1940.

December bookings of 224,808 tons were 87 per cent greater than in the corresponding month of 1949, although they were down from the revised totals for November and October, 245,500 and 236,170 tons respectively.

Shipments last year amounted to 1,931,527 tons, increase of 4 per cent over the 1,853,536 tons shipped in 1949. December shipments were 175,575 tons, 30 per cent over the corresponding month of the previous year. November and October figures for last year have been revised to 167,059 tons and 183,218 tons, respectively.

Backlogs at yearend for the following four months only, were at 736,340 tons and for the period beyond 1,177,695 tons, total potential of 1,914,035 tons.

Boston — Check on second quarter structural rollings against bridge tonnage under contract has been requested by Washington. There are delays in fixing closing dates on new work. New inquiry is down with substantial volume for power plants to come out later. Expected out this spring are bridges, Merrimack river, near Newburyport, Mass., and a bascule, Meriden street, Boston-Chelsea, totaling 6000 tons. Some mills are booked into fourth quarter on sheet piling. Massachusetts has closed direct on 14,000 tons of H-piling and sheet piling, deliveries over an extended period.

Philadelphia — While fabricators are moving cautiously in accepting new business because of the uncertainty of steel supply, most are booked months ahead, some well into next year. Shape mills are booked through April on DO-rated tonnage and are setting up schedules for that month on the car program. They will set up allocations of non-rated tonnage for April around the middle of this month. Outstanding award involves approximately 7500 tons for a power plant at Cromby, Pa., for the Philadelphia Electric Co.

Pittsburgh — The Pennsylvania State Labor & Industry Department reports drop of $19.4 million in building operations for all types of construction in December. Number of permits declined from 4843 in November to 3296 in December. Building of a $3 million bridge and two major roads are on Allegheny County's construction schedule for 1951. The county is making every effort to start work on the following projects this year: Fleming Park bridge on Neville Island to route 51 in Stowe Township; Homeville road extension; and the Center avenue improvement. The Homeville road extension will necessitate a 600-foot bridge over the Union Railroad tracks.

Cleveland — Effect of government restrictions on general commercial construction remains to be determined. Whether shape tonnage on order from the mills for future delivery will be affected is uncertain. Fabricators expect only jobs of a defense or other so-called essential nature will be allowed. Even industrial construction not carrying a DO rating is not likely to be allocated tonnage. Currently, building activities are down seasonally and the uncertainty with respect to future supplies of steel has tended to discourage inquiry. Few new sizable jobs are before the trade.

Seattle — Structurals are in strong demand with large tonnages involved in several major projects, chiefly government construction. Work in Alaska will take a large amount of steel over the next six months. Local fabricators have three months' order backlog. Coast mills are making substantial deliveries but fabricators report difficulty obtaining certain items from eastern plants.

Wire . . .

Wire Prices, Page 161

Boston — Wire schedules for April will be affected by restrictions or shortages of other metals, tin, nickel, zinc and copper for many non-essential uses. Zinc supply hampers galvanizing and finishing operations are geared closely to limited rod inventories, notably high carbon. Alloy rated volume is heavier, demand for screws in those grades building up rapidly for cold-heading stock. Communications wire and cable orders also include a high ratio of rated volume.

New York — Heavier impact from defense requirements will affect wire scheduling for April. Contributing will be restricted use of several nonferrous metals in many civilian products, expected to result in revised specifications for substitute materials as second quarter lengthens. This may delay scheduling of many products, although some specialties have been assigned capacity for April due to longer processing required. While some increase is noted in rated defense orders, procurement at mill levels in volume has not been reached by numerous programs, aircraft included.

Los Angeles — Supply of wire products lags far behind demand. Extreme shortages of wire mesh cause fabricators for the construction industry to use more reinforcing bar.

Semifinished Steel . . .

Semifinished Prices, Page 159

Los Angeles — Expansion of steelmaking facilities at the Vernon plant of Bethlehem Pacific Coast Steel Corp., including another 75-ton electric furnace, will boost ingot-capacity to 840,000 tons annually.

Plates . . .

Plate Prices, Page 159

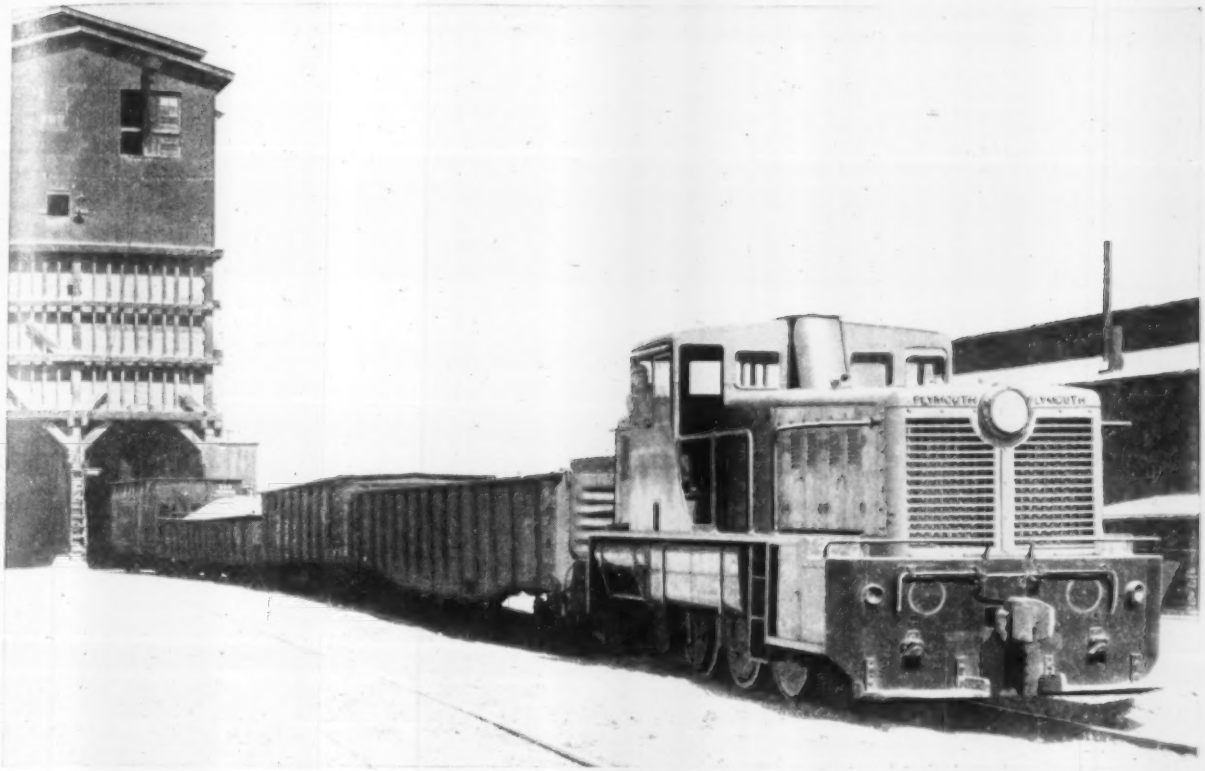
Philadelphia — Bids closed Jan. 31 on 50 cargo ships for the Maritime Commission but it may be some time before distribution of the steel required. Indications are the tonnage will be given a DO rating and will not be set up under a general allocation program, such as now prevails for cars. It is thought, however, there may be an allocation program for ship repairs apart from new ship construction and that if and when it is set up it will not be applicable before May. The cargo ships on which bids were recently closed will require 225,000 tons of hull steel, of which 60 per cent will be plates, 35 per cent shapes and 5 per cent bars.

New York — Most plate sellers can accept DO-rated orders for May delivery. However, military contracts for plates are stepping up and another two or three weeks should see producers covered for the quarter on DO-rated business, at least on the basis of present minimum quotas which are unchanged at 15 per cent. As for allocation programs, there has been no action yet beyond April and that has applied only to existing programs for cars and lake ore boats. By the middle of this month, however, it is possible that not only will these programs be extended for the remainder of the quarter and on a somewhat heavier scale (there is no change in the volume for April), but additional allocation programs be set up, thus substantially increasing the amount of defense work the mills will have to turn out in the next 3-month period.

Boston — Assignment of essential program plate tonnage in addition to directly rated volume will be heavier in second quarter with volume available for civilian use reduced. Tank shops are operating with limited inventories of light sizes. Shipbuilding is expected to broaden distribution through sub-contracts. Most fabricating shops are in position to take on this type of work. Backlogs with navy yards are relatively higher than those with private shipbuilders.

Pittsburgh — Substantial increase in the rated tonnage load on mills is expected for delivery in May and succeeding months. Additional programs likely to be formalized by mid-February include steel for barge, locomotive, maritime, and ship repair. Considerable plate tonnage is involved in the 1,890,000 tons of finished steel scheduled for oil country goods in 1951. There is growing evidence some strip mill facilities may be diverted to production of light plates by early third quarter.

San Francisco — Plates are in critical supply even without shipbuilding activity. If the Pacific Coast is allocated new ship work, non-rated orders would be in a difficult position



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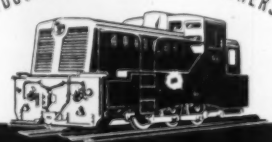

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from the standpoint of supply. However, more sub-contracting work would develop, aiding fabricators now without substantial DO ratings.

Seattle—Plate fabricators are seeking defense orders as they cannot obtain material for ordinary jobs. Considerable plate tonnage for proposed tank construction is pending.

Manganese Ore . . .

New York—Manganese ore is coming into this country on old contracts placed at 79.8c to 81.8c per long ton unit, 48 per cent manganese, c.i.f., duty for buyer's account.

Quotations on new orders of Indian manganese 46-48 per cent, for nearby shipment, are 92c to 96c per long ton unit, c.i.f., duty for buyer's account.

Prices on South African Transvaal chrome ore, 44 per cent no ratio, and 48 per cent no ratio, have been advanced to $24.00-$25.00 and $31.00-$32.00, per gross ton, f.o.b. cars New York, Philadelphia, Baltimore and Charleston, S. C., plus ocean freight differential or delivered to Portland, Oreg., Tacoma, Wash.

Recent advances in foreign ores reflect increases in ocean freight rates of from $1.50 to $5.00 per ton.

Pig Iron . . .

Pig Iron Prices, Page 158

Cleveland—Foundry melt is maintained in this area despite limited supplies of pig iron, scrap and coke. Voluntary allocation of iron by merchant sellers assures steady flow of tonnage to customers based upon their requirements. This is preventing any serious interruption in foundry schedules. Melters have augmented pig iron supply with larger proportion of scrap in melts but the high price of cast scrap is discouraging further extension of this practice. Expectations are pressure on the pig iron market will ease in event government stabilization authorities roll back cast scrap prices. Pig iron production here was curtailed last week as several blast furnaces were shut down due to the rail strike. The Toledo, O., stack, however, has been blown out for repairs and will be out of production through March.

New York—District foundries are able to sustain operations despite the increasing shortage of pig iron. But it is becoming increasingly difficult, for scrap as well as pig iron is in more stringent supply. Should foundries generally go on a 6-day per week schedule they would find the problem of raw material supply complicated. There is increasing buying of foreign iron but unfortunately for new buyers, shipments are several weeks off. About the best that can be done, short of paying excessive premiums, is April.

Buffalo—Increased volume of DO orders is noted in the merchant pig iron market. Shipments to Michigan motor casters were interrupted partially by the railroad walkout. Shippers were not loading cars they thought might be tied up. As a result, some iron is being sent other consumers.

Philadelphia—Pig iron consumers show increasing concern over the supply outlook. In addition to a definite shortage of domestic iron, buyers are experiencing increasing difficulty in obtaining foreign iron on schedule, to say nothing of placing new orders abroad on promise of reasonably early delivery.

Pittsburgh—Union Steel Castings Division, Blaw-Knox Co. has been awarded an initial $1.3 million contract by the Defense Department for cast steel armor. The company is expending about $2.5 million to expand facilities about 100 per cent for production of cast steel armor.

Growing tightness in merchant pig iron supply is expected to force at least voluntary allocation by producers to foundries supplying castings for classified programs.

Cincinnati—Foundries are holding the melt below potential capacity with the shortage of pig iron a principal factor. Foundry coke is also in tight supply. Suppliers foresee little chance for expansion of tonnage soon. Shipments may be slowed by severe weather.

Chicago — The 30-day inventory regulation on pig iron, compared with the former "practical minimum working" inventory, confronts foundries effective Mar. 1. This matter may be more academic than real, since iron has been in short supply for months with suppliers adhering to a quota system. Assumption is that imported iron will be included with domestic for inventory purposes. Closing of the Brandon lock in the Illinois river for repairs is interfering with barge shipments up the Mississippi, forcing rail shipment of foreign iron from New Orleans at higher cost. A walkout of railroad switchmen here last week forced Wisconsin Steel Co. to bank two of its three blast furnaces. "A" stack of Interlake Iron Corp. at South Chicago resumed Jan. 15; it had been blown out Dec. 18 for relining.

St. Louis—Pig iron demand is high and steady. Producers are surprised at the lack of consumer reaction to the price freeze. Foundries, especially, seem unworried although their inventories are low. Output has been steadily at capacity, with customers on allocations and deliveries seldom lagging more than 30 days.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 162

Pittsburgh — Supply of foundry coke meets trade requirements, aided in considerable measure by growing shortage of pig iron. A few foundries have successfully offset shortage of pig iron by increasing use of scrap in melts. However, operations in general are restricted by raw material shortages other than coke. Sellers await official decision relative to coal prices. An advance of at least 50 cents a ton in oven foundry coke quotations is expected.

Cincinnati—The pinch in supplies of by-product coke is attributed to stepped-up demands. Coal production is steady. Prices are unchanged but the rise in miners' wages, if not considered within the freeze, may start a chain reaction.

Chicago — The strike of railroad switchmen is threatening foundries operating with low coke inventories. Shipments of fuel from some ovens in the Chicago and Milwaukee areas are under embargo and the tieup is interfering with switching of loaded cars from main tracks into foundry yards. Even before the strike foundry operators complained that coke was more critical than iron, yet no shutdowns or serious curtailments from fuel exhaustion are known. Suppliers are adhering to strict quota control for regular customers but shipments have arrived at destination irregularly because of transportation difficulties.

Scrap . . .

Scrap Prices, Page 168

Pittsburgh—Major steel mills were forced to come into the market for dealer open-hearth grades at $5 per ton above the previously established formula levels to prevent local material from flowing into the Youngstown district. Such action raised No. 1 heavy melting steel to $51.50, a new peak. Higher prices paid for dealer open-hearth scrap grades do not apply on customer scrap in the case of at least one producer. Nor do they apply on No. 1 railroad heavy melting or other railroad items, as well as turnings, low phos or cast iron grades. The increase is not thought likely to prevail under the formalized schedule of prices expected to be announced momentarily by government authorities. Expectations are the government will fix a ceiling of $45 per ton or less on No. 1 heavy melting steel here.

Philadelphia—Scrap prices are unchanged pending word from Washington on a rollback. New schedules have been printed by the price fixing authority, but no public announcement had been made up to the time this issue went to press. Adverse weather conditions and increasing shortage of freight cars are hampering movement to some extent.

Buffalo—Controls and lower prices are expected momentarily in scrap. Dealers continue to rush shipments against orders placed at sharply higher levels. Expectations are controls will erase the recent price advance and put prices near formula levels. Higher prices are bringing out much more material.

Cleveland — Open-hearth scrap prices advanced $5 a ton here to the basis of $50.50 to $51. Turnings, cast and railroad grades held unchanged. Mills are accepting tonnages at $5 a ton over the formula, pending issuance of government scrap price order. Consumers are in a precarious supply situation which has deteriorated rapidly in the last few days due to shipping difficulties. A severe snow storm hampered operations in yards and shipments by truck, while the movement via railroads was made uncertain by the switchmen's strike. Practically all steel mills are low on scrap; one major electric furnace melter in the Valley took three furnaces off last week due to shortage of scrap.

Cincinnati — The iron and steel scrap market is holding prices unchanged, at the mill formula heretofore set, as the frozen quotations pending any further action in Washington. Mills are asking tonnage to support an all-time high volume in steelmaking, and material is coming out freely excepting when se-

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vere weather conditions handicap processing and shipment.

Detroit—Scrap market was disorganized last week as traders awaited issuance of price schedules from Washington. Because of its imminence, bidding on individual carlots of scrap was an auction. The price freeze only served to contain prices within the boundaries which had been defined up to Jan. 25, so prices swung in a wide latitude. Word just before press time was that the so-called formula prices would govern on open-hearth grades, but that cast items would be subject to a roll-back. Cast buying was at a virtual standstill.

Chicago—Delay in announcement of the scrap price order, coupled with the railroad switchmen's strike and extreme winter weather, produced a listless scrap market. Price changes are confined to small increases in turning and boring grades. For the most part, brokers are shipping against old orders, but the flow is off sharply as result of embargoes necessitated by the rail tieup. The strike also is restricting movement of steelmaking scrap from this area to eastern points, a situation that had gained some momentum because of more attractive prices offered. Foundries are acquiring melting material on a hand-to-mouth basis. It is unlikely that scrap will be purchased in any volume until the new schedule is announced. Yard operations of dealers are at a standstill due to subzero temperatures and heavy snows.

St. Louis—Delay in effecting scrap controls is causing district steel mills to hold out of the market. There may be additional delay in the expected purchasing surge because severe weather and gas shortages have curtailed operations at Laclede and Scullin steel companies. Current scrap quotations are nominal. Eastern and southern markets are making inroads into this district's supply.

San Francisco—Scrap prices held unchanged in the face of continued heavy demand and decreased volume offshore. Consumers report scrap shipments from the Far East and Europe are becoming less frequent.

Seattle—Scrap is arriving at tidewater in limited tonnages. Supply conditions are critical but the mills have sufficient material in yards to carry on for 60 days.

Dealers' receipts are small. Recent closing of the shipyards due to labor trouble restricted the flow of scrap from that source.

A Portland firm has purchased a large consignment of army vehicles and other equipment in the South Pacific area which is expected to provide considerable scrap.

Foundries report sufficient cast iron scrap for current requirements. Prices are unchanged.

Iron Ore . . .

Iron Ore Prices, Page 163

Cleveland—National Steel Corp., Pittsburgh, has acquired a 15 per cent interest in the Reserve Mining Co. organized several years ago to develop a practical process for extracting iron from taconite. The Reserve company controls deposits at the eastern end of the Mesabi range in Minnesota with estimated reserves of 1,500,000,000 tons of taconite, equivalent to 500 million tons of ore running 60 per cent iron. Others holding interests in the Reserve company are Armco Steel Corp. and Republic Steel Corp.

Warehouse . . .

Warehouse Prices, Page 163

Chicago—Although inventories are short and unbalanced warehouses continue to do a fair job of accommodating customers. Receipts from mills, which closely match quotas promised, are dispatched to consumers as fast as they arrive. Quotas starting Mar. 1 will show some reduction under the increased DO tonnage which mills must supply and expanded support program requirements. As yet there is no indication of sharp drop in civilian goods manufacture.

New York—Rated orders are heavier and due to lack of stock in wanted specifications are sometimes unfilled. Sales volume is limited by lack of inventory with inquiry heavy, frequently in mill lots. Replacement warehouse quotas, affected by slow buying in first half last year, are watered down by rated and essential tonnage requirements to the extent but 40 to 50 per cent of expected tonnage is likely this month.

Cleveland—Some local distributors report fair receipts from the mills though tonnage is insufficient to do much in the way of stock replenishment. Warehouse inventories are badly unbalanced but small consumers' needs generally are being cared for through use of substitute grades. Increasing amount of defense business is coming to the warehouses, from 8 to 10 per cent of current volume being estimated on DO account.

Cincinnati—January volume of district warehouses was off from levels of recent months due to shortage of stocks. DO orders have picked up. Beams and cold-finished bars joined the list of extremely scarce items.

Los Angeles—Distributors, with inventories at low level, are hampered in replacing stocks by fabricators who save their DO's for mill purchases. Inventories of warehouses stocking European steel are generally in good shape on certain items. Immediate shipment is offered on hot-rolled strip, flats, angles, and rounds.

San Francisco—Warehouses are selling more tonnage than they are taking in—a situation which is creating the necessity of allocating supplies carefully. DO numbers are more actively sought, although they, as yet, constitute only a small part of total warehouse sales.

Seattle—The warehouse market situation is unchanged. Supplies are critically short but prices are steady. There is strong demand for all out-of-stock items, turnover being limited by the lack of tonnage. More DO priorities are in evidence.

Canada . . .

Toronto, Ont.—Production of iron and steel shapes in Canada for October, 1950, amounted to 376,953 net tons, compared with 367,515 the month preceding and 279,743 in October, 1949. Output included 364,395 net tons of carbon shapes and 1,558 tons of alloy shapes.

During the month shipments for sale amounted to 257,802 net tons and included 245,357 tons of carbon and 12,445 tons of alloy steel shapes, 18,724 tons, semifinished shapes, 19,127 tons, structurals, 15,500 tons, plates, 19,654 tons, rails, 4224 tons, tie plates and track material, 44,555 tons, hot-rolled bars, 22,048 tons, pipes and tubes, 23,903 tons, wire rods, 29,052 tons, black sheets, 8103 tons, galvanized sheets, 6853 tons, castings, 12,903 tons, other rolled products.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7500 tons, power plant, Philadelphia Electric Co., for erection at Cromby, Pa., to Bethlehem Steel Co.

650 tons, estimated, Navy purchasing office, Washington, to Belmont Iron Works, Philadelphia.

500 tons, 23rd street viaduct, Chicago, for Chicago Park Board, to American Bridge Co., Pittsburgh; Simpson Construction Co., Chicago, contractor.

300 tons, Henry Barnard hall, Teachers' College, New Britain, Conn., to Standard Structural Steel Co., Hartford, Conn.; Edward Pactor Co., Weathersfield, Conn., general contractor.

275 tons, Racine avenue pumping station extension, Chicago, to American Bridge Co., Pittsburgh; Fitz Simons & Connell Dredge & Dock Co., Chicago, contractor.

STRUCTURAL STEEL PENDING

9415 tons, Captree State parkway, bridge development for Jones Beach Parkway Authority, Suffolk county, New York; American Bridge Co., Pittsburgh, low.

3000 tons, beam bridges for various locations, Pennsylvania state department of property and supplies, Harrisburg, Pa.; bids Feb. 15.

3472 tons, item 29, contracts FAOT51-1, FARC51-4 and FAST51-1, Erie county, New York state Department of Public Works, Albany; bids Feb. 14; also 875 tons of bar reinforcement, item 28; 70,000 square yards of metal reinforcement for concrete pavement, item 25; 16,850 square yards of steel fabric reinforcement, item 25F; 24½ tons of spiral bar reinforcement, item 28AS; 3190 lineal feet of metal railing, items 37A, V & C; and 14,400 lineal feet of steel bearing piles, item 85S.

2200 tons, also 375 tons reinforcing bars, Columbia river cantilever bridge, Wasco county, Oregon; general contract awarded Guy F. Atkinson Co., Portland, Oreg., low, $1,908,527.

1600 tons, including material for tainter gates, spillway, Fort Randall reservoir project, near Lake Andes, S. Dak.; bids about Mar. 23, Corps of Engineers, Omaha, Nebr.; also 200 tons miscellaneous metal.

1500 tons, also 2000 tons reinforcing bars, Ross dam powerhouse; bids to Seattle, Feb. 21.

1500 tons, transmission towers and other equipment, naval communications center, Near Arlington, Wash.; general contract to Morrison-Knudsen Co. and City Electric & Fixtures Co., Seattle, joint low bid, $1,088,605.

1500 tons, plant, Piasecki Helicopter Corp., Morton, Pa.; pending.

1400 tons, Associated Grocers warehouse, Seattle; bids in.

500 tons or more, two 100 gantry cranes for Albeni Falls power house; Star Iron & Steel Co., Tacoma, low $417,930.

400 tons, bridge superstructure, Reading Co., East Weston, N. J.; bids closed.

375 tons, WOR-TV Station, 68th St. and Columbus Ave., New York; pending.

350 tons, Burrowes Memorial Bldg., Pennsylvania State College, State College, Pa.; bids Feb. 7.

350 tons, plant, Raybestos-Manhattan Inc., Crawfordsville, Ind.; William F. Lotz Inc.,

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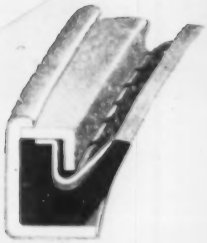
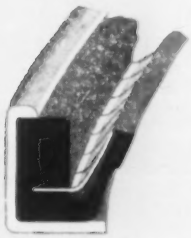
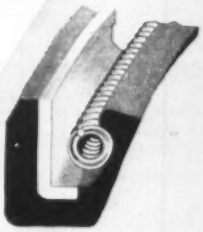


Model 51—A sturdy seal for medium speeds. May be used on reciprocating rods and against moderate pressures.

Model 53—An efficient, general purpose seal for high speeds. For shafts above 3" dia.



Model 63—An efficient, general purpose seal for high speeds. For shafts 3" dia. and smaller.



Above—*Model 91B*—A spring-loaded seal of small cross section, with the metal reinforcing member surrounded by rubber.

Below—*Model 91A*—A springless seal of small cross section, with the metal reinforcing member surrounded by rubber.

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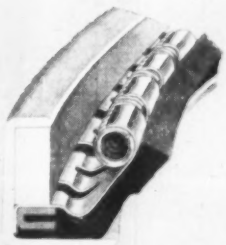


Model 64—A strong, effective seal for heavy duty on shafts of the largest diameter.

Garlock KLOZURE Oil Seals have established outstanding service records on many kinds and types of equipment where the sealing of the lubricant in a bearing and the exclusion of dirt and foreign matter from a bearing have presented a difficult problem.

KLOZURES are produced in a variety of types and models and in a wide range of sizes including Metric O. D. to fit bearing manufacturers' standard bores.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada Ltd., Montreal, Que.

SUPERIOR Performance

Philadelphia, general contractor.

300 tons, estimated, three ore unloading docks, serviced by gantry cranes, Pennsylvania railroad, Philadelphia; bids asked.

250 tons, carbide plant, Air Reduction Co., Calvert City, Ky.; bids to be closed by United Engineers & Constructors Inc., Philadelphia, Feb. 6.

200 tons, bridges, Pennsylvania railroad, Morrisville, Pa.; bids closed Jan. 31.

Unstated, spillway bridge and other items, Canyon Ferry project; bids to Bureau of Reclamation, Denver, Jan. 25; bids received Dec. 28 rejected.

Unstated, three radial gates, hoists, etc.; bids to Bureau of Reclamation, Denver, Feb. 20.

Unstated, ordnance vehicle shop, Fort Richardson, Alaska; bids to U. S. Engineer, Feb. 28.

Unstated, redecking steel bridge, Portland, Oreg.; General Construction Co., Portland, general contractor.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 tons, central heating and power plant, Fort Richardson, Alaska, to Northwest Steel Rolling Mills Inc., Seattle; Patti-MacDonald Co., general contractor.

500 tons, elevated structures and new highways, East Boston expressway, Boston, to Bethlehem Steel Co.; V. Barletta Co., Boston, general contractor.

440 tons, vault, Harris Trust & Savings Bank, Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

150 tons, naval barracks for Jim Creek communications center, Washington state, and miscellaneous jobs, to Bethlehem Pacific Coast Steel Corp., Seattle.

113 tons, Y.M.C.A. building, Harvey, Ill., to Joseph T. Ryerson & Son Inc., Chicago; Jacobson Bros. Co., Chicago, contractor.

REINFORCING BARS PENDING

1500 tons, Fort Randall reservoir project, near Lake Andes, S. Dak.; bids about May 20, Corps of Engineers, Omaha, Nebr.

935 tons, item 2S, bar reinforcement, Contract Cap. S. P. 51-1, Suffolk county, New York state Department of Public Works, Albany, bids Feb. 14; also 94,500 square yards of metal reinforcement for concrete pavement, item 2S; 8000 square yards of steel fabric reinforcement, item 25F; and 1680 lineal feet of metal railing, item 237B & X.

245 tons, two bridges, Riverdale road, Carters Creek, Md.; bids Feb. 14, Bureau of Public Roads, Arlington, Va.

190 tons, two bridges, Laurel-Bowie road, Maryland; bids Feb. 9, Bureau of Public Roads, Arlington, Va.

165 tons bars and shapes, Alewife Brook conduit pumping station, Somerville, Mass., Berke-Moore, Inc., Boston, low, general contract.

Unstated, five-story, $1.2 million territorial office building; bids to John D. Argetsinger, Public Works department, Juneau, Alaska, Feb. 28.

PLATES . . .

PLATES PLACED

610 tons, hull steel, Navy purchasing office, Washington, to Bethlehem Steel Co.

Unstated tonnage, gas storage sphere, Metropolitan district commission, Quincy, Mass., to Pittsburgh-Des Moines Steel Co., New York, $30,800.

PIPE . . .

CAST IRON PIPE PENDING

500 tons or more, 12 to 4 inch cast iron pipe, also meters, hydrants, etc.; bids to Oakway water district, Eugene, Oreg., Feb. 14; alternative figures invited.

RAILS, CARS . . .

RAILROAD CARS PLACED

Canadian National, 40 thirty-ton steel frame box cars, to Eastern Car Co., Montreal, Que.

Reading Co., 1000 hoppers and 1000 gondolas, to Bethlehem Steel Co. for delivery in the first quarter of 1952; these cars are in addition to 1000 hoppers and 500 gondolas recently let to this builder for delivery this year.

RAILROAD CARS PENDING

Army Transportation Corps depot, Marietta, Pa., one hundred and fifty 10,000-gallon tank car, 56½ in. gage; bids Feb. 5.

FERROALLOYS

(Continued from page 163)

4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

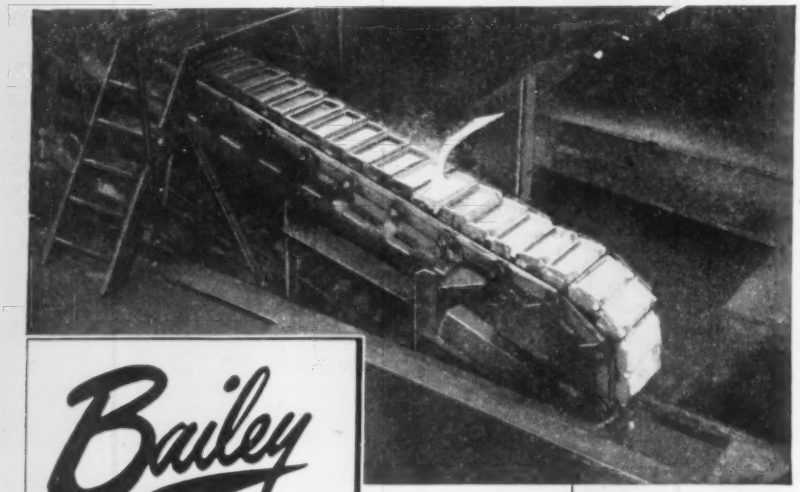
Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N, add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 8 M x D, bulk, 23.25c per lb of contained Cr, c.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

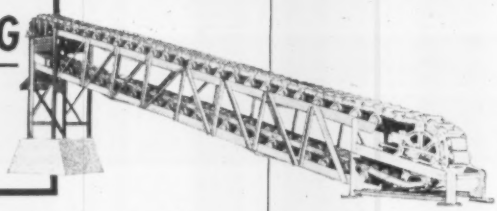
Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, Carload, packed, 8 MxD, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34.41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 20.65c per pound of contained chromium plus



Bailey

PIG CASTING MACHINE



For Ferrous and Non-Ferrous Smelters and Foundries

Ruggedly constructed for low-cost service, this machine is completely self-contained. If necessary it can be moved by crane and erected wherever needed. Once it is set in place, only an electrical connection is necessary for operation. The complete unit consists of the machine proper, motor, gear unit, variable speed reducer and drive.

CAPACITIES: 3 tons per hour to 50 tons per hour, 15 ft. to 100 ft. in multiples of 5 ft.

STATIONARY WHEEL

for Longer Service— Greater Economy

Bailey Stationary Wheel design eliminates 80% of the moving parts of the conventional type. The moulds are supported by endless chains that run on top of idler wheels which are mounted at stationary positions along the strand.

WILLIAM M. Bailey COMPANY

ENGINEERS

LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

THE BETTER WE PRODUCE THE STRONGER WE GROW

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STEEL

11.50c per pound of contained silicon, F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.4c per lb of contained silicon plus aluminum, 3" x down, delivered.

NOTE: Prices on tungsten, silicon, titanium, vanadium, calcium, zirconium, boron and other ferroalloys appeared on pages 122 and 123, Jan. 29, 1951, issue.

Where You Can't Use Nickel

(For additional details on limitations on use of nickel see page 19.)

Stainless Steel—Nickel Bearing

Agriculture farm equipment, etc.: Barn cleaners; ensilage cutters; feeding troughs; fertilizer spreading equipment; grain bins and cribs; implements; hand tools, etc.; silos; spreaders.

Automotive: Bumpers; clad; clad panels for hoods; grille; hardware; horn rings; hubcaps; muffler; (except on heavy duty equipment); steering wheel; spoke wire, trim; wheel rings and wheel covers.

Construction: Curtain walls; decorative trim; doors; down spouts; elevator and escalator face plates and panels; flashing; gutters; moldings; roofing; screens (except in extractive or manufacturing industries where no other substitute is available); sheathing; spandrels; storefronts; window frames.

Domestic appliances and utensils (except cooking ware): Ash trays; cabinets; cake and pie dishes; cake servers; canisters; cooling racks; counter tops; deep freeze units; sheathing; drainboards; egg beaters; flat wire; furniture; garbage cans; hardware; ironing boards; irons; ladles; mixing bowls; mixing spoons; pan cleaners; potato mashers; range tops; refrigerator shelves, trim and dishes; sinks; spatulas; table tops; toasters; utility cans; washing machine tubs.

Electrical machinery and equipment: Pole line hardware; pole line guy wires; radio towers; transmission tower baskets.

General: Automatic vending machines; bar equipment; beer barrels; coal bins and coal hoppers (except in coal preparation plants); diesel grills; jewelry (except watch cases); pens and pencils (except fountain pen nibs and separate fountain pen inner caps); radio antennas (except military); railings; soda fountains; sporting goods, all applications; toys; water coolers; water softener tanks.

Railroad: Trim and decorative parts in passenger cars.

Shipbuilding: Pleasure craft galleys; pleasure craft decorative trim; pleasure craft rigging; pleasure craft stack and ventilating shafts.

Miscellaneous: Bank inst.; valves; binder (index books); button parts; cheese slicer; cocktail shaker and accessories; cup holders; dairy equipment (except functional uses); deodorizers; diaper pins; dog leashes; fly screen; garden accessories; hardware parts, including builders finishing hardware; humidifiers; lightning rods; mirror clips; musical instrument strings; organ springs; paint brush ferrules and rivets; permanent wave equipment; phonograph needles; pot cleaner; refuse cans; rulers; teabag staples; tooth brushes; water reservoir (gum tape machines); weather stripping; shovels (except food and chemical).

High Nickel Alloy

Building materials: All sheet metal building applications including but not limited to: Air ducts; downspouts; elevator cabs; flashings; garbage grinder parts; gutters; leaders; louvers; roofing; siding; sinks; sink bowls; skylight framing; brick anchors; hanger wire for suspended ceiling construction; ornamental and decorative applications; tie-wire for suspended ceiling construction.

Domestic appliances: Element name plates; element pan on electric range; oven linings; radiant broilers on gas ranges; range crumb trays; range tops; range vents; refrigerator light shields; refrigerator shelf parts; steam roof casings; washing machine tubs.

Dry cleaning (except for functional uses): Condenser tubing; irons; lint traps; pads for dry cleaning presses and tailors' presses; piping, valves and fittings; solvent pressure filters, including filter cloth; spotting boards; sump tanks; truck tubs; utensils; water separators.

Food servicing and kitchen equipment: All food service applications including but not limited to: Bar equipment; beverage tubing; bottle beverage cabinets; cafeteria counters; deep freeze cabinets; dishwashing machines; electric food warming cups; ice cream cabinets; mobile food trucks; refrigerated food display cases; scullery and dishwashing sinks; soap dispensers; soda fountains; steam tables; water coolers; work tables.

Hospital equipment: Counter tops; furniture; instrument cabinets; instrument tables; kick and push plates; linen cabinets; medicine cabinets; operating tables; paneling and wainscoting, decorative; surgical lights; work t...

Jewelry: Ash trays; badges; cigarette ...ers; collar buttons; comb trim; costume ...elry; cuff buttons; emblems; finger nail ...es jewelry; key chains; knives (except bla... necklaces; novelties; pill containers; pen and pencil parts; perfume flacons; watch brac... watch cases; watch chains; watch cr... watch inserts, (movement holders); watch strap pinions.

Laundry equipment: Laundry chutes; ... racks; plant truck tubs; rug pole pins; ... storage tanks; sorting tables; starch c... ironers, rug cleaning machines, trim on ... work; utensils, ventilating hoods and ... washers, for blankets, silks, etc; water ... age tanks.

Motor vehicles: Antennas; battery ca... hub caps; exhaust gaskets; exhaust manif... windshield wiper blades.

Miscellaneous: Barbecue grills; bits ... spurs; ferrules; out door stoves; portable re... frigerator; sporting goods, all applications.

Nickel Plating

Communications: Escutcheon plates; kn... name plates; radio and television, decorative trim; speaker grilles.

Hardware: Bells; boat trim and accessories; builders' finishing hardware (except half trim for bathroom and toilet side of door); casket hardware; chimes; curtain hooks; door catches; door knobs; door knockers; drawer pulls; harnesses; hinges; kick plates; leashes; letter boxes; locks, luggage hardware; nails; picture frames; picture hangers; push plates; screen door and window hardware exclusive of screws; screws; switch plates; tacks; valve handles with the exception of bathroom and kitchen fixtures.

Household appliances (except parts subject to destructive abrasion and heat and except the strike prior to silver plating or vitreous enameling): Including but not limited to: Food mixers; heaters; polishers; refrigerators (except shelving and door handles); washing machines; waxers; vacuum cleaners (except runners).

Jewelry—Clocks: Alarm clocks; clocks; costume jewelry; lighters; pens and pencils (except functional brass parts); trim and optical glasses (except frames); watches.

Metal furniture and fixtures: Commercial furniture, all decorative parts; electrical fixtures; home furniture, all decorative parts; napkin dispensers; store display cases; store fixtures; straw dispensers.

Motor vehicle (etc.): Accessories; dash panels (including instruments, controls and appearance items mounted in or on dash panels); escutcheon plates; gas caps; gravel guards; grilles; horns; interior trim; lamp housing; license frames; name plates; ornamental trim around windows; radiator trim; trim rings; wheel discs; window levers; all other parts with the exception of window frames and slide channels, external and internal door handles, the bumpers, bumper guards, bumper bolts, hub caps, and exposed screws where no satisfactory substitutes are possible. The nickel employed for protection of bumper guards and bumpers should not exceed that amount equivalent to an average thickness of 0.001-inch on outside surfaces.

Novelties: Ash trays; coasters; cocktail shakers and accessories; clothing ornamentation; cosmetic containers; hair curlers; handbag trim; humidors; ornamental buttons; smoking stands.

Plumbing: Basin supports; cabinet trim; soap dishes; shower curtain rods and rings; shower doors and trim; tooth brush holders; towel racks; tumbler holders.

Sheet, strip and wire products: All decorative parts fabricated from plated sheets, strips or coils; bird cages; clothes hangers; display stands; lamp shades; shopping carts; vending machines.

Tools: Drills; flexible metal tapes (except measuring tape); hammers; office machines and business machines, decorative trim; planes; pliers; power tools (except for functional parts); punches; rules; saws; screw drivers; wrenches.

Toys: Bicycles (except handle bars, sprockets, spokes and hubs); mechanical toys; pistols; toys; trains; tricycles; wagons.

Utensils (except the strike necessary prior to silver plating or vitreous enameling): Flatware; hollow ware; serving dishes; serving utensils; racks; trays.

Miscellaneous: Electric fans; gambling equipment; ornamentation on musical instruments; pin ball machines; slot machines; sporting goods; tonsorial equipment (except tools); vending machines.

Nickel Silver

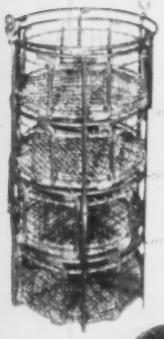
All uses except: Communications equipment, functional parts; dairy equipment; draughting instruments; electrical equipment, functional parts; engineering instruments; eyelets; flat and hollow ware, not over 15 per cent nickel; fountain pen separate inner caps; hospital equipment; keys, not over 10 per cent nickel; optical goods; orthopedic appliances; pins; slide fasteners; tonsorial tools; watch cases, not over 10 per cent nickel; springs, where required for functional purposes.

Hotter than Hades!

BUT

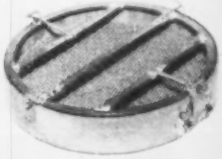
STANWOOD CONTAINERS

CAN TAKE IT!

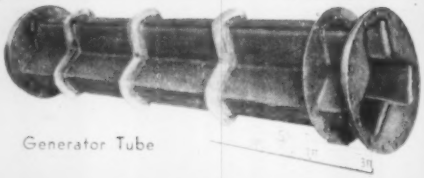


BASKETS, trays, fixtures give you many more hours of service — more trips through the furnace—when they are of correct Stanwood design and Stanwood-specified heat and corrosion resistant alloys, based on long experience. Let the Stanwood representative in your locality assist you. Send for Catalog.

Tray with locking cover



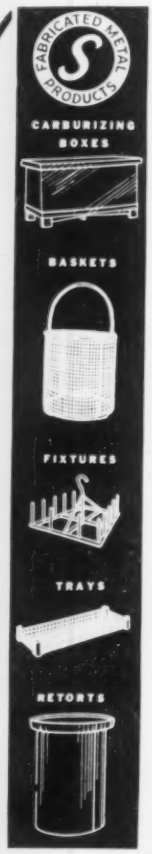
Stacking Fixture



Generator Tube

Stanwood Corporation

4825 W. Cortland St., Chicago 39, Ill.



Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Alabama

Monsanto Chemical Co., St. Louis, was awarded a contract by the Army for design and construction of a chlorine-caustic plant in the vicinity of TVA, Muscle Shoals, Ala. Chemical Corps made an initial allocation of $5 million to the Office of the Chief of Engineers for construction of the plant. Leonard Construction Co., Chicago, will be the subcontractor on construction.

Arkansas

Columbian Carbon Co., New York, plans to build a furnace-type carbon black plant with an annual capacity of 36 million pounds at El Dorado, Ark. Carbon black will be produced from byproducts of oil wells in the vicinity.

California

Hayden-Lee Corp., Los Angeles, is building a plant for **Teletronic Laboratories Corp.** in the International Airport Industrial tract, that city. The company will design and manufacture precision electronic equipment in the $200,000 plant.

California

Rheem Mfg. Co., Richmond, Calif., let a contract for a building in San Pablo, Calif., at an estimated cost of $1 million. It is being built to accommodate potential war work. Rheem manufactures steel drums and household water and space heaters. During World War II it made depth charges and steel drums for the military.

California

Permanente Cement Co.'s fifth kiln, now under construction, is expected to be in operation in February, increasing capacity to 7 million bbl a year. It will make this Kaiser enterprise in Los Altos, Calif., one of the largest single cement producing plants in the world.

California

A. O. Smith Corp., Milwaukee, consolidated all of its West Coast activities into a Pacific Coast Division. Headquarters of the new division are in Los Angeles.

Illinois

Precision Castings Inc., Niles, Ill., awarded a contract to Austin Co., Cleveland, for a $1 million factory unit.

Illinois

Interstate Steel Co., Evanston, Ill., plans to build a $100,000 plant in that city.

Illinois

Ferguson-Lander Box Co., Aurora, Ill., awarded a contract to Phillip Thrall, that city, for erection of a factory and office building to cost $200,000.

Illinois

Flat Metal Mfg. Co., Franklin Park, Ill., awarded the general contract for erection of an addition to its plant to E. H. Peterson, Chicago.

Illinois

Whiting Corp., Harvey, Ill., awarded the general contract for a $300,000 addition to its factory to Norman Hobson, 15214 Park Ave., Harvey, Ill. John F. Stromberg, Chicago, is the architect.

Illinois

American Can Co., New York, let a contract for a $150,000 office building in Maywood, Ill., to LaSalle Construction Co., Chicago.

Iowa

Dewey & Almy Chemical Co., Cambridge, Mass., contemplates construction of a branch plant to cost about $300,000 in Cedar Rapids, Iowa.

Kansas

Hutchinson Foundry & Steel Co., Hutchinson, Kans., signed a distributorship agreement to handle **Worthington Pump & Machinery Corp.,** Harrison, N. J., construction equipment.

Massachusetts

Kieley & Mueller, North Bergen, N. J., appointed Joseph H. Bertram & Co. as sales representative covering all of New England except Connecticut, with offices at 209 Washington St., Boston. Kieley & Mueller manufactures industrial control valves.

Michigan

Hanna Engineering Works, Chicago, appointed Industrial Air & Hydraulic Equipment Co., Detroit, as exclusive sales representative of its products in Michigan. Hanna manufactures air and hydraulic cylinders and controls.

Michigan

Gordon Kinney Inc. changed its name to **J. Alex Gordon & Co.,** Detroit, sales representative for Automatic Trans-

A Green Kid?
Sure . . . but a qualified
Pickle Tank Tester!

With FERRO PICKLE PILLS, even your newest workman is qualified to make quick, accurate tests of pickling solutions. Minimum requirements are ability to tell red from green . . . count to twelve.

For years, standard equipment in the best pickling rooms, there's a Ferro Pickle Pill for every need . . . a simple, sure method of determining the solution percentage of sulphuric acid, muriatic acid, alkali and metal cleaning tanks . . . or the iron content of any of these solutions.

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ALL INDUSTRIES
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Patent Covered Hot Tops and Bottom Plugs for Ingot Molds for Alloy Steels
High Grade Clay and Fire Brick for Furnaces, Boilers, Cupolas, Coke Ovens, etc. Edge Pressed Brick for accurate sizing.
Difficult Shapes a Specialty
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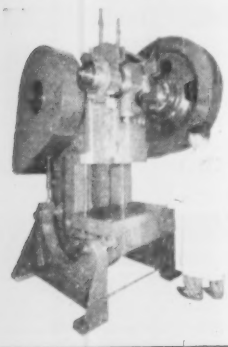
BARS ★ SMALL SHAPES ★ STRIP
BOLARDI STEEL CORPORATION
300 Lower Market St. Milton, Penna.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85 TON POWER PRESS
NOW you can get the added strength of the PRESS-RITE Built-in high tensile steel tie rod frame plus back gearing for smoother power at slower speeds.
WRITE TODAY FOR FREE BULLETIN!

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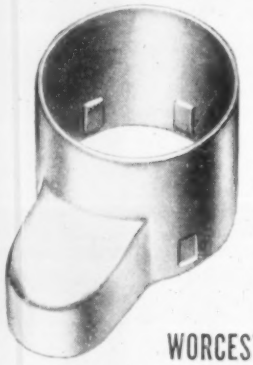
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Looking for a dependable source of supply to keep an un-interrupted flow of parts coming in on scheduled time? Our reputation is behind every promise date. Send blueprints or samples for quotation.
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IF IT'S *RIVETED* YOU KNOW IT'S SAFE
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MOLINE "HOLE-HOG" MACHINE TOOLS
HAVE SERVED AMERICAN INDUSTRY
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MOLINE TOOL COMPANY
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- Corrosion-proof construction of pickling, processing and storage tanks; industrial flooring.
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THEORY AND PRACTICE OF ROLLING STEEL By **Wilhelm Tafel**
312 Pages
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Covers every angle of the design, construction and operation of the steel rolling mill.
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Book Department, 1213 W. 3rd St., Cleveland 13, O.

poration Co., Chicago. Edward W. Addis was named vice-president of the Gordon firm.

Missouri

Mallinckrodt Chemical Works, St. Louis, awarded the general contract for a laboratory and warehouse to be erected in that city to Dickie Construction Co., St. Louis.

New Jersey

H. K. Ferguson Co., Cleveland, was awarded a $650,000 contract for construction at Picatinny Arsenal, Dover, N. J. Contract calls primarily for installation of process equipment. Work is being carried out under direction of the New York district of the Corps of Engineers.

New York

Universal Atlas Cement Co., United States Steel Corp. subsidiary, moved its New York offices to 100 Park Ave.

New York

Air Reduction Co. Inc. sold for cash its entire holdings of stock of U. S. Industrial Chemicals Inc. to National Distillers Products Corp., all of New York.

North Carolina

Industrial Electric Co., Fayetteville, N. C., was named a dealer for **Allis-Chalmers Mfg. Co.** motors, controls, pumps, transformers and Texrope drive equipment in 17 central and southeastern North Carolina counties and in five northeastern South Carolina counties.

Pennsylvania

Engine Division, **National Supply Co.,** Pittsburgh, completed consolidation of its sales and service facilities with those of **Atlas Imperial Diesel Engine Co.** Purchase of the assets of the Atlas Engine Co. by National Supply was consummated on July 24, 1950.

Canada

Morgan Construction Co., Worcester, Mass., received a $10 million contract for a strip mill for rolling steel for stainless steel tubing at Sault Ste. Marie, Ont., from **Algoma Steel Corp. Ltd.,** that city. Canadian General Electric Co. Ltd., Toronto, Ont., will construct the main electrical drive for $1.6 million.

READY FOR ERECTION: Reaching 190 feet toward the clouds, this erection equipment is awaiting the arrival of a 200-foot hypersorber tower at Dow Chemical Co., Midland, Mich. To be installed by Austin Co., Cleveland, the unit will separate light hydrocarbon gases. Shipment from its fabricator, Foster-Wheeler Corp., Carteret, N. J., created a problem for the railroads, despite its being shipped on specially-built flat cars in two pieces. Special routing and daylight movement only were specified for the 12-foot diameter unit

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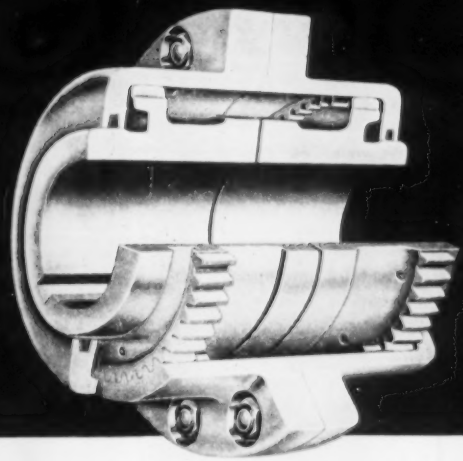

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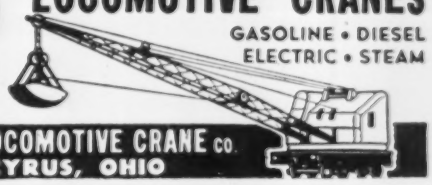

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